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Environmental Impact Statement NV063-EIS07-019

DATE: October 2012

MOUNT HOPE PROJECT
FINAL
ENVIRONMENTAL IMPACT STATEMENT
VOLUME I of III

File Number: NVN-082096
File Number: NVN-084632
File Number: NVN-091272

Cooperating Agencies:
Eureka County
National Park Service
Nevada Department of Wildlife

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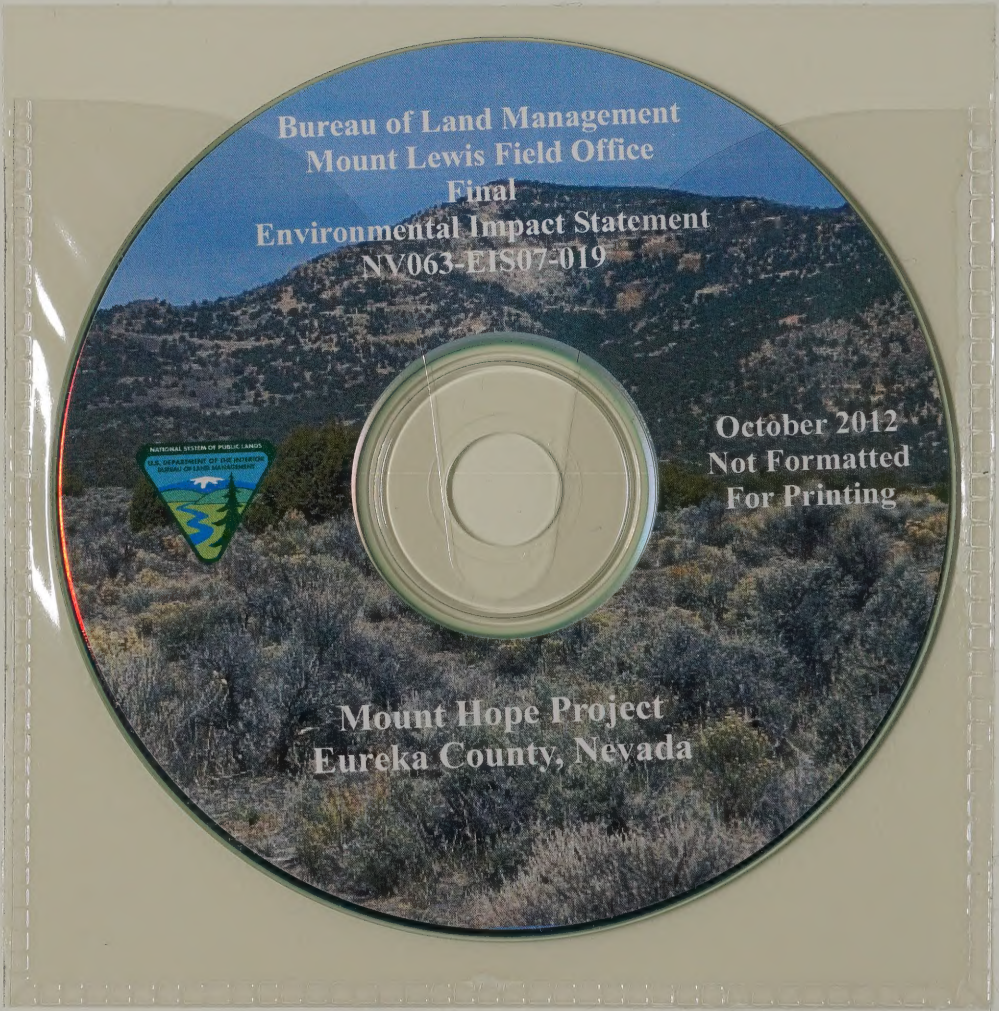
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MOUNT HOPE PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT

OCTOBER 2012

Lead Agency:
U.S. Department of Interior
Bureau of Land Management
Mount Lewis Field Office

Cooperating Agencies:
Eureka County
National Park Service
Nevada Department of Wildlife

Project Location:
Eureka County, Nevada

EIS Number: NV063-EIS07-019
Plan of Operations Number: NVN-082096
Right-of-Way Numbers: NVN-084632
NVN-091272

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ABSTRACT

The Mount Hope Project is located on public land administered by the Bureau of Land Management and on private land controlled by Eureka Moly, LLC. The 80-year project would have an 18- **to 24**-month construction phase, 44 years of mining and ore processing, 30 years of reclamation, and five years of post-closure monitoring. Concurrent reclamation would not commence until after the first 15 years of the Project. The Mount Hope ore body contains approximately 966 million tons of molybdenite (molybdenum disulfide) ore that would produce approximately 1.1 billion pounds of recoverable molybdenum during the ore processing time frame. Approximately 1.7 billion tons of waste rock would be produced by the end of the 32-year mine life and approximately 1.0 billion tons of tailings would be produced by the end of the 44 years of ore processing. Optimal development of the molybdenum deposit, to meet the market conditions and maximize molybdenum production, would utilize an open pit mining method and would process the mined ore using a flotation and roasting process. The surface disturbance associated with the proposed activities totals 8,3**55** acres on both public and private lands.

Responsible Official for the EIS:
Christopher J. Cook
Field Manager
Mount Lewis Field Office

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MOUNT HOPE PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT

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APPENDICES

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Appendix D: **Mount Hope Project Mitigation Summary Plan (12 pages)**
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  Attachment 3: **Mount Hope Greater Sage-Grouse Conservation Measures (7 pages)**
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Appendix E: **Mount Hope Socioeconomic Supplemental Analysis (14 pages) and ECSD Data (5 pages)**
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ACRONYMS AND ABBREVIATIONS

Reader Note: Refer to the list below for abbreviations or acronyms that may be used in this document.

>	greater than **(in a table)**
<	less than **(in a table)**
24/7	24 hours per day / seven days per week
ABA	Acid Base Accounting
afy	acre feet per year
Ag	Silver
AGP	Acid Generating Potential
AHPA	Archaeological and Historic Preservation Act of 1974
AIRFA	American Indian Religious Freedom Act
Al	Aluminum
AML	Appropriate management level
amsl	above mean sea level
ANFO	Ammonium nitrate/fuel oil mixture
ANSI	American National Standards Institute
AP	Acidification potential
APE	Area of Potential Effect
AQMA	Air Quality Management Area
ARD	Acid Rock Drainage
ARPA	Archaeological Resources Protection Act of 1979
As	Arsenic
Au	Gold
AUM	Animal unit month
BAPC	Bureau of Air Pollution Control
BAQP	Bureau of Air Quality Planning
BBA	Brown-Buntin Associates, Inc.
BCCRT	Basic City-County Relief Tax
BCLLC/SDLLC	Blankenship Consulting LLC and Sammons/Dutton Consulting LLC
Be	Beryllium
BEA	Bureau of Economic Analysis
bgs	below ground surface
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMDO	Battle Mountain District Office
BMPs	Best Management Practices
BMRR	Bureau of Mining Regulation and Reclamation
B.P.	Before Present
BPIP	Building Profile Input Program
C	**Carbon**
Ca	**Calcium**
CAA	Clean Air Act

CAAA	Clean Air Act Amendments of 1990
$CaCO_3$	Calcium Carbonate
Cd	Cadmium
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	Cumulative Effects Study Area
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm/sec	centimeters per second
CN	Curve number
CO_2(e)	Carbon dioxide equivalent
CO	Carbon monoxide
CNIDC	Central Nevada Interagency Dispatch Center
Cu	Copper
CWA	Clean Water Act
dB	**Decibels**
dBA	Decibels (A-weighted)
(^{o})	Degree
^{o}F	Degrees Fahrenheit
DEM	Digital Elevation Model
DMV	Nevada Department of Motor Vehicles
DOE	Department of Energy
DWS	Drinking Water Standards
EA	Environmental Assessment
ECI	Electrical Consultants, Inc.
ECSD	Eureka County School District
Eh	Reduction potential
EIS	Environmental Impact Statement
EML	Eureka Moly LLC
EMS	Emergency Medical Services
EMTs	Emergency Management Technicians
ENM	Environmental Noise Model
EO	Executive Order
EPA	Environmental Protection Agency
EPCM	Engineering, Procurement and Construction Management
EPCRA	Emergency Planning and Community Right-To-Know Act
ESA	Endangered Species Act
ET	Evapotranspiration
F	Fluorine
Fe	Iron
FeMo	Ferromolybdenum
FeSi	Ferrosilicon alloy
FIFRA	**Federal Insecticide, Fungicide, and Rodenticide Act**

FLPMA	Federal Land Policy and Management Act
FMCSA	Federal Motor Carrier Safety Administration
FMU	Fire Management Unit
FMUD	Final Multiple Use Decision
FR	**Federal Register**
FTE	Full Time Equivalent
g	Gravity
GBCGR	Great Basin Center for Geothermal Research
GHG	Greenhouse gas
GID	General improvement district
GIS	Geographic Information System
GMMP	Growth Media Management Plan
gpd	gallons per day
gpm	gallons per minute
GPS	Global Positioning System
H	Horizontal
H_2SO_4	sulfuric acid
HA	Herd Area
HAP	Hazardous air pollutant
HCT	Humidity cell test
HDPE	High density polyethylene
HFRA	Healthy Forests Restoration Act
Hg	Mercury
HMA	Herd Management Area
Hp	Horsepower
HSA	Hydrologic Study Area
HSWA	Hazardous and Solid Waste Amendments
ICP	Induced Coupled Plasma
IM	Instruction Memorandum
IMC	Independent Mining Consultants
IMP	Interim Management Policy
InSAR	Interferometric Synthetic Aperture Radar
Interflow	Interflow Hydrology
I-80	Interstate 80
JBR	JBR Environmental Consultants, Inc.
IPCC	Intergovernmental Panel on Climate Change
K	coefficient of permeability
kg	kilogram
KOP	Key observation point
Ktons	1,000 tons
kV	kilovolt
KVCWF	Kobeh Valley Central Well Field
kW	kilowatt

L_{dn}	Level day/night
L_{eq}	Average noise level
L_{50}	Median noise level
LCR	Lahontan Cutthroat Recovery
LCRS	Leak Collection and Recovery System
LCT	Lahontan cutthroat trout
Li	Lithium
LLDPE	Linear low density polyethylene
LGO	Low-grade ore
LPAG	Limited potentially acid generating (in a table)
LSST	Local School Support Tax
LTFM	**Long-Term Funding Mechanism**
m	meters (in a table)
Ma	Million years ago
MBTA	Migratory Bird Treaty Act
MCL	Maximum contaminant level
MDBM	Mount Diablo Base and Meridian
MDD	Maximum Daily Demand
mg	milligrams
mg/kg	**milligrams per kilogram**
mg/L	**milligrams per liter**
mg/m^3	milligrams per cubic meter
$\mu g/L$	micrograms per liter (in a table)
$\mu g/m^3$	micrograms per cubic meter (in a table)
MIBC	**Methyl Isobutyl Carbinol (MIBC)**
mil	One thousandth of an inch (1 mil = 0.001 inch)
MLFO	Mount Lewis Field Office
MLRA	Major Land Resource Area
mm	Millimeters
MMPA	Mining and Mineral Policy Act of 1970
Mn	**Manganese**
Mo	Molybdenum
MOU	Memorandum of Understanding
Mph	Miles per hour
MS	Mass spectrometry
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
MTP	Master Title Plat
MW	megawatt
MWMP	Meteoric Water Mobility Procedure
N	Nitrogen
Na	Sodium
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code

NAD	North American **D**atum
NAG	Net acid generating
NAGPRA	Native American Graves Protection and Repatriation Act
NAIP	National Agricultural Imaging Program
NASS	Nevada Agricultural Statistics Service
NDE	Nevada Department of Education
NDEP	Nevada Division of Environmental Protection
NDETR	Nevada Department of Employment, Training and Rehabilitation
NDF	Nevada Division of Forestry
NDOA	Nevada Department of Agriculture
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NDPS	Nevada Department of Public Safety
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act
NFP	**National Forest Plan**
NFS	National Forest System
NHPA	National Historic Preservation Act
Ni	Nickel
NMCP	Nevada Mercury Control Program
NNHP	Nevada Natural Heritage Program
NNP	Net neutralizing potential (NP-GP)
NNPS	Nevada Native Plant Society
NO_2	Nitrogen dioxide
NOAEL	No Observed Adverse Effect Level
NOI	Notice of Intent
Non-PAG	Non-potentially acid generating
NP	Neutralization Potential
NPDES	National Pollution Discharge Elimination System
NPEA	National Pony Express Association
NPR	Neutralization potential ratio
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NRS	Nevada Revised Statutes
NSAAQS	Nevada **S**tate **A**mbient **A**ir **Q**uality **S**tandards
NSO	Nevada State Office of the Bureau of Land Management
NSPS	New source performance standards
NvMACT	Nevada **M**aximum **A**chievable **C**ontrol **T**echnology
NWIS	National Water Information Service
NWS	National Weather Service
O_3	Ozone
OHV	Off-highway vehicle

OHWM	Ordinary high water mark
OPLMA	Omnibus Public Land Management Act
oz/yd^2	ounces per square yard
PA	Programmatic Agreement
PAG	Potentially acid generating
Pb	Lead
PC	**Primary crusher (in a table)**
PCRI	Properties of **C**ultural or **R**eligious **I**mportance
PFC	**Properly functioning condition**
PFYC	Potential **F**ossil **Y**ield **C**lassification
PGH	**Preliminary General Habitat**
pH	Potential of hydrogen
PHGA	Peak horizontal ground acceleration
PILT	Payments in Lieu of Taxes
Plan	Plan of Operations
PM$_{2.5}$	Particulate matter less than 2.5 micrometers in aerodynamic diameter
PM$_{10}$	Particulate matter less than 10 micrometers in aerodynamic diameter
POD	Plan of Development
ppb	**parts per billion**
ppm	parts per million
PPH	**Preliminary Priority Habitat**
PRP	**Paleontological Resources Preservation**
PRIME	Plume Rise Mode Enhancement
PRISM	Precipitation-Elevation Regressions on Independent Slopes Model
Project	Mount Hope Project
PRPA	Paleontological Resource Protection Act
PSD	Prevention of significant deterioration
PWR	Public Water Reserve
RAS	**Rangeland Administration System**
RCRA	Resource Conservation and Recovery Act
RFFA	Reasonably Foreseeable Future Action
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right-of-way
RPS	**Rangeland Program Summary**
RUSLE2	Revised Uniform Soil Loss Equation
RV	Recreational Vehicle
S	Sulfur
SA	Sensitivity Analysis
SAG	Semi-autogenous grinding
SARA	Superfund Amendment and Reauthorization Act of 1986
Sb	Antimony
SB	Senate Bill
Sc	Selenium

SCCRT	Supplemental City-County Relief Tax
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SEL	Sound Exposure levels
SHPO	State Historic Preservation Office
Si	Silicon
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Site
SLERA	Screening level ecological risk assessment
SMP	**Species Management Plan**
Sn	Tin
SO_2	Sulfur dioxide
SO_4	Sulfate
SR	State Route
SRK	SRK Consulting, Inc.
SSURGO	Soil survey geographic database
st/d	Short tons per day
st/y	Short tons per year
SWC	Smith Williams Consultants, Inc.
TCP	Traditional cultural property
TCW	Temporary construction worker
TDS	Total dissolved solids
Th	Thorium
Tl	Thallium **(in a table)**
TMO	Technical grade molybdenite oxide
Tpd	Tons per day
Tph	Tons per hour
TPH	Total petroleum hydrocarbons
Tpy	Tons per year
TRI	Toxics release inventory
TRV	Toxicity reference values
TSF	Tailings storage facility
TV	Television (in a table)
UBC	Uniform Building Code
UNR	University of Nevada, Reno
U.S.	United States
USACE	U.S. Army Corps of Engineer
U.S.C.	United States Code
USDA	United States Department of Agriculture
USDOI	United States Department of Interior
USDOT	United States Department of Transportation
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

UTM	Universal Transverse Mercator (in a table)
V	Vertical
VFD	Volunteer Fire Department
VFS	Volunteer Fire Service
VOC	Volatile organic compounds (in a table footnote)
VRM	Visual Resources Management
W	Tungsten
WEG	Wind erodibility group
WFRHBA	Wild Free-Roaming Horses and Burros Act of 1971
WPCP	Water Pollution Control Permit
WRCC	Western Regional Climate Center
WRDF	Waste rock disposal facility
WRMP	Waste Rock Management Plan
WSA	Wilderness Study Area
WWTF	Waste Water Treatment Facility
yd^3	Cubic yard
Zn	Zinc

EXECUTIVE SUMMARY

Purpose of this Document

Eureka Moly, LLC plans to develop the Mount Hope Project in central Nevada approximately 23 miles northwest of Eureka, Nevada. The Mount Hope Project is located on public land administered by the Bureau of Land Management and on private land controlled by Eureka Moly, LLC. The specifics of the Mount Hope Project are outlined in the Mount Hope Project Plan of Operations, submitted in June 2006, and most recently revised in July 201**2**.

This **Final** Environmental Impact Statement has been prepared by the Bureau of Land Management, the Lead Agency with respect to compliance with the National Environmental Policy Act and its implementing regulations, and with the following Cooperating Agencies: Nevada Department of Wildlife, Eureka County, and the National Park Service. The purpose of this document is to analyze the environmental effects of the Proposed Action, associated with the proposal by Eureka Moly, LLC to develop the Mount Hope open pit mine, as well as alternatives to the Proposed Action.

The purpose of the **Final** Environmental Impact Statement is to inform decision makers in all federal agencies required to approve authorizing actions, as well as state and local governments and the public, of the anticipated significant environmental effects of the Proposed Action, the possible ways to mitigate any significant effects associated with the Proposed Action, and reasonable alternatives, which could feasibly reduce the significant environmental impacts of the Proposed Action. The information in an Environmental Impact Statement does not control an agency's discretion on a project.

The **Final** Environmental Impact Statement has been prepared in **three** volumes with appendices. All technical documents used to support this **Final** Environmental Impact Statement are available for review during normal business hours (Monday through Friday, excluding holidays, from 7:30 a.m. to 4:30 p.m.) at the Bureau of Land Management's Mount Lewis Field Office in Battle Mountain, Nevada.

Proposed Action

The Proposed Action consists of three connected actions. The first action consists of the activities proposed in the Plan of Operations. The remaining actions are associated with the two rights-of-way applications and associated Plans of Development.

The 80-year Mount Hope Project would have an 18- **to 24-**month construction phase, 44 years of mining and ore processing, 30 years of reclamation, and five years of post-closure monitoring. There would be no concurrent reclamation during the first 15 years of the Mount Hope Project. The years of operation presented in this Environmental Impact Statement are anticipated; however, there is a potential that the timing of the implementation or duration of components of the Mount Hope Project could vary. The Mount Hope ore body contains approximately 966 million tons of molybdenite (molybdenum disulfide) ore that would produce approximately 1.1 billion pounds of recoverable molybdenum during the ore processing time frame. Approximately 1.7 billion tons of waste rock would be produced by the end of the 32-year mine life and approximately 1.0 billion tons of tailings would be produced by the end of the 44 years of ore processing. Optimal development of the molybdenum deposit to meet the market conditions and maximize molybdenum production would utilize an open pit mining method and would process the mined ore using a flotation and roasting process. The location of the waste rock disposal facilities, the tailings disposal facilities, and the mill and roasting facilities adjacent to the open pit would be the most efficient location to meet Eureka Moly LLC's needs for the Mount Hope Project.

The Mount Hope Project would consist of the following: a) an open pit with a life of approximately 32 years and associated pit dewatering; b) waste rock disposal facilities where waste rock would be segregated according to its potential to generate acid rock drainage; c) milling facilities including a crusher, conveyors, semi-autogenous grinding and ball mills, flotation circuits, concentrate dewatering, ferric chloride concentrate leach circuit, and filtration and drying circuits that would operate for approximately 44 years; d) a molybdenite concentrate roaster and packaging plant to package the technical grade molybdenum oxide in bags, cans, or drums; e) a ferromolybdenum plant for production of ferromolybdenum alloy using a metallothermic process and separate packaging plant for drums and bags; f) two tailings storage facilities and associated tails delivery and water reclaim systems; g) an ongoing exploration program utilizing drilling equipment, roads, pads, and sumps; h) Low-Grade Ore Stockpile that would feed the mill after mining ceases; i) water supply development with associated wells, water delivery pipelines, access roads, and power in the Kobeh Valley Well Field Area; j) a 24-mile, 230-kilovolt electric power supply line from the existing Machacek substation, with a substation and distribution system located in the Project Area. The powerline would join the existing Falcon-Gondor 345-kilovolt line right-of-way near the Town of Eureka and follow the existing utility corridor to the Project Area; k) a realigned section of the existing Falcon-Gondor powerline, which would require the filing of a separate right-of-way amendment at the time it is needed (near Year 36); l) ancillary facilities including haul, secondary, and exploration roads, a ready line, warehouse and maintenance facilities, storm water diversions, sediment control basins, pipeline corridors, reagent and diesel storage, storage and laydown yards, ammonium nitrate silos, explosives magazines, fresh/fire suppression water storage and a process water storage pond, monitoring wells, an administration building, a security/first aid building, a helipad, a laboratory, growth media/cover stockpiles, borrow areas, mine power loop, communications equipment, hazardous waste management facilities, a Class III waivered landfill, and an area to store and treat petroleum contaminated soils; m) turn lane(s) on State Route 278; n) the option for the receipt of off-site concentrates for toll roasting; and o) the closure of the tailings storage facility and the potentially acid generating waste rock disposal facility with the use of evapotranspiration cells to manage the long-term discharge from these facilities, as well as the physical reclamation of Project components. The surface disturbance associated with these proposed activities totals 8,355 acres.

No Action Alternative

In accordance with Bureau of Land Management's National Environmental Policy Act Handbook H-1790-1, Section 6.6.2 (BLM 2008a), an Environmental Impact Statement evaluates the No Action Alternative. The objective of the No Action Alternative is to describe the environmental consequences that would result if the Proposed Action were not implemented. The No Action Alternative forms the baseline from which impacts of all other alternatives can be measured.

Under the No Action Alternative, Eureka Moly, LLC would not be authorized to develop the Mount Hope Project and mine the Mount Hope ore body as currently defined under the Proposed Action. The No Action Alternative would result from the Bureau of Land Management disallowing the activities proposed under the Plan of Operation. However, Eureka Moly, LLC would be able to continue permitted exploration activities as outlined in previously submitted notices. The area would remain available for future mineral development or for other purposes as approved by the Bureau of Land Management.

Partial Backfill Alternative

Under this alternative, the Proposed Action would be developed as outlined and have the same surface disturbance footprint. However, at the end of the mining in the open pit, the open pit would be partially backfilled to eliminate the potential for a pit lake. The pre-mining ground water elevation in the vicinity of the open pit varies from northwest to southeast across the open pit from approximately 7,200 to 6,750 feet above mean sea level. Therefore, the open pit would be backfilled to an elevation that varies from northwest to southeast across the open pit from approximately 7,300 to 6,850 feet above mean sea level. The Partial Backfill Alternative addresses potential impacts associated with a pit lake that would develop under the Proposed Action.

The backfilling would commence in Year 32 and be completed in approximately 13 years (95 million tons per year). The partial backfilling would be accomplished by the same fleet and personnel that completed the mining, and as a result, employment would be approximately 370 employees through the end of ore processing (Year 44) and then there would be a reduction in staffing from Year 44 through the completion of the partial backfilling (Year 45). The partial backfilling would be completed using approximately 1.3 billion tons of waste rock, which would comprise all the waste rock from the Non-Potentially Acid Generating Waste Rock Disposal Facility resulting in an elimination of the Non-Potentially Acid Generating Waste Rock Disposal Facility. This material would be removed from the completed waste rock disposal facilities and transported back to the open pit. The partial backfilling would need to be completed to an elevation that ranges across the open pit from 7,300 to 6,850 feet above mean sea level. As a result of this alternative, the mining fleet and the associated employees would continue beyond the end of the mining sequence to complete the backfilling activities. Tax revenues would be similar to the Proposed Action over the 44-year life of this alternative. Under this alternative, the floor of the open pit would be reclaimed with an application of growth media and then seeded with a BLM approved seed mix.

Off-Site Transfer of Ore Concentrate for Processing Alternative

Under this alternative, the open pit, waste rock disposal facilities, and tailings disposal facilities would be developed as outlined under the Proposed Action; however, the ore processing facilities would include only the milling operations to produce molybdenum sulfide concentrate. The technical grade molybdenum oxide and the ferromolybdenum portions of the processing facility would not be constructed, and as a result, the surface disturbance footprint would be approximately 20 acres less than under the Proposed Action. In addition, the leaching of the concentrate would likely not be done on site. The production of molybdenum sulfide concentrate would occur at an average rate of approximately 45.8 million pounds per year. This material would be stored at the Project Area in a concentrate storage structure adjacent to the mill. The molybdenum sulfide concentrate would be loaded from this storage facility into street legal haul trucks with covered containers and transported on the public transportation system to either an existing or new facility. Employment, relative to the Proposed Action, would be reduced by approximately 30 individuals. Tax revenues would be similar to the Proposed Action over the 44-year life of this alternative.

The Slower, Longer Project Alternative

Under this alternative the Project would operate at approximately one-half the production rate as described in the Proposed Action, which would result in a project that would last approximately twice as long as the Proposed Action.

Under this alternative, the currently planned 96 million short tons per year mining rate would be reduced to 48 million short tons per year and the mill throughput would be reduced from 60,500 tons per day of ore to 30,313 tons per day. Although salable molybdenum production on an annual basis would drop in half, the ultimate mine and associated waste and low-grade stockpiles, process plant, and tailing impoundments would still cover the same area, creating the same amount of disturbance; however, **some aspects of environmental disturbance (i.e., wildlife) would be greater due to the extended duration and impacts to additional springs**.

Under this alternative, smaller equipment than outlined under the Proposed Action would need to be purchased. Thus, the manufacture lead times for this new equipment may result in construction time frames that are longer than outlined in the Proposed Action, because the equipment is not yet available. This would also delay the commencement of operations of the Project. The Project production time frame under this alternative would extend to at least 88 years.

It is likely that initial capital costs for this alternative would be reduced; however, this difference cannot be quantified without completing a re-design of the facilities. It is expected that sustaining capital costs would actually increase due to the much-extended operating life and operating cost (expressed as total cost per pound of production) would rise due to increased proportion of fixed costs and the higher per unit of ore variable costs of a smaller scale operation. More serious diseconomies of scale would affect the plant during the final two decades of production when treating the low-grade ore (grading 0.042 percent molybdenum), which would be set aside for milling following the end of the open pit mining phase.

An alternative with half the annual production of the Proposed Action has not been designed **since this alternative was not determined to be economically feasible by EML**; however, for the sake of comparison, there are several facets of a half-production rate project that could be anticipated. Mining and processing equipment would be smaller, as would ancillary facilities (powerline supply and well field **infrastructure** for example). However, ultimate disturbance from the tailings impoundments, open pit, and waste rock disposal facilities would eventually grow to the same size as in the proposed Project, albeit at half the rate. Water consumption rates would be approximately half, although economies of scale (lower per unit operational costs when there are greater throughputs) would be lost, and water consumption on a per-unit basis would be higher than in the Proposed Action (i.e., more evaporation on a per unit basis than under the Proposed Action) **because the open water in the tailings pond would exist for twice as long**

during the processing of the same amount of ore. Therefore, this alternative would likely result in twice as much evaporation. The smaller plant size would likely result in a slight decrease in the number of construction employees. Operations employees would be less than that required for the Proposed Action (regardless of the size of mine or mill equipment, it generally takes the same number of employees to operate and maintain it). It is estimated that the decrease in operations employment for this alternative would be about 30 percent. The employment timeframe would be twice as long as under the Proposed Action. Reagent consumption would be the same on a per-unit (of production) basis, but the smaller consumption rate would decrease storage requirements and material shipments. Profitability would be reduced relative to the Proposed Action, as would tax revenues, because of the higher costs for every pound of molybdenum produced while receiving the same price as the Proposed Action for each pound of molybdenum. Tax revenues would be reduced by approximately 40 percent, relative to the Proposed Action, in the first 44 years of this alternative.

While the Slower, Longer Project Alternative may not meet the purpose and need as stated in the Environmental Impact Statement, the Bureau of Land Management elected to analyze this alternative in detail at the request of a cooperating agency (Eureka County). The Bureau of Land Management's decision is consistent with its responsibility as the lead agency according to "A Desk Guide to Cooperating Agency Relationships and Coordination with Intergovernmental Partners" and 40 Code of Federal Regulations 1501.6.

Alternatives Considered and Eliminated From Detailed Consideration

As outlined in the Environmental Impact Statement, several alternatives were identified for consideration in this **Final** Environmental Impact Statement. The following is a discussion of those alternatives identified through the scoping process, including alternatives identified by the public that have been eliminated from detailed consideration in this **Final** Environmental Impact Statement. The alternatives were considered relative to their means of addressing the identified purpose and need, their technological feasibility, and their potential to address environmental issues and reduce potential impacts to a level less than significant when compared to the Proposed Action.

The analysis of alternatives in this Environmental Impact Statement is based on the following criteria: a) public or agency concern; b) technical feasibility; c) potential to reduce an environmental impact of the Proposed Action; d) ability to meet the purpose of and need for the Proposed Action; and e) compliance with regulatory and legal guidance (i.e., **Mining and** Mineral Policy Act of 1970).

Complete Backfill Alternative

This alternative is eliminated from detailed consideration because it would involve the complete backfilling of the proposed Mount Hope open pit with Mount Hope overburden and waste rock material in the two waste rock disposal facilities. A Complete Backfill Alternative would primarily address potential visual impacts **and evaporation impacts** associated with the Proposed Action. The intent of this alternative is not to address issues associated with the development of a pit lake, since that issue is addressed under the Partial Backfill Alternative. The

Partial Backfill Alternative is discussed above, and the associated impacts are outlined in Table ES-1.

Based on the mine plan and pit configuration, backfilling could not begin until the end of the mining sequence. Under this alternative, the same amount of surface disturbance would occur as under the Proposed Action because the backfill material would be hauled to the waste rock disposal facilities so that the Mount Hope open pit could be mined. Once the ore was removed from the open pit, the waste rock and overburden would then be hauled back from the waste rock disposal facilities to the open pit. The backfill would likely commence in Year 32 and be complete in approximately Year 64, resulting in a project that is 20 years longer than the Proposed Action. The rim of the open pit has varying elevations. At the southeastern corner of the open pit, the pit rim elevation is approximately 6,900 feet above mean sea level. The northwestern corner of the open pit is part of the highwall cut into Mount Hope, which has an elevation of 8,200 feet above mean sea level. The ore to waste ratio is 1:1.6 and the swell factor for the volume difference for the mined and handled waste rock as compared to unmined rock is conservatively assumed to be 20 percent. Therefore, the waste rock volume would be insufficient to completely fill the open pit. As a result, the northwestern portion of the open pit would remain with a highwall on the southeastern flank of Mount Hope, and the waste rock disposal facilities would be eliminated. The complete backfilling of the open pit would be accomplished by the same fleet and personnel that completed the mining, and as a result, employment would be approximately 370 through the end of ore processing (Year 44) with a reduction in staffing from Year 44 through the completion of the complete backfilling (Year 64).

Backfilling the open pit would result in covering additional mineral resources that would not be currently considered ore, such as the lower grade molybdenum mineralization in the open pit wall and the other metal mineralization that is known to occur in the surrounding host rock adjacent to the open pit walls. Though not a reason to eliminate this alternative from detailed consideration, this scenario would be inconsistent with the Mining and Mineral Policy Act of 1970 (30 United States Code 21a) and the Materials and Mineral Policy, Research, and Development Act of 1980 (30 United States Code 1601) because it would reduce the opportunity for future mineral development associated with the mineralizing system in the Mount Hope area.

This alternative would decrease visual impacts from the Proposed Action to the Pony Express Historic Trail but not below the level of significance. Although visual impacts would be reduced, the area is classified as visual resource management Classes III and IV, and implementation of the Proposed Action would be consistent with the restrictions on visual resource management Class III and IV areas. The open pit would remain visible due to insufficient backfill material. This alternative would increase air quality impacts resulting from increased transport of waste rock material and would decrease the opportunity for future extraction of potential mineral resources. The mining work force for the project would be employed for a longer time period to accomplish the backfilling operations. In addition, this alternative would have similar potential impacts as the Partial Backfill Alternative. **Under this alternative, the ground water quality within the pit backfill would be anticipated to be impacted by waste materials (Non-PAG) deposited in the open pit and from infiltrating the runoff from pit walls. This poor-quality water could flow from the confines of the former pit shell into the surrounding ground water, degrading waters of the state.** For these reasons, the Complete Backfill Alternative does not meet the selection criteria and has been eliminated from detailed consideration.

Different Waste Rock Disposal Facility Heights Alternative

Under this alternative, the waste rock disposal facilities configurations would be changed so that the waste rock disposal facility heights would vary. Lower heights on the southern portion of the waste rock disposal facility would be established in an effort to reduce the impacts to the Historic Trail setting. As a result, the footprint of the waste rock disposal facilities would be increased to accommodate the change in storage volume. This would increase the time necessary to construct the waste rock disposal facilities, assuming the same equipment fleet as under the Proposed Action, and therefore increase the length of time necessary to complete the mining of the open pit. Therefore, activities under this alternative would occur over a longer time period when compared to the Proposed Action. This alternative would increase the amount of surface disturbance and, therefore, the impacts to vegetation, wildlife, and soils, as well as increase air emissions, due to an increase in the time frames for mining and longer haul distances, during the life of the Mount Hope Project. This alternative would decrease, but not substantially reduce, the impacts to the Pony Express Historic Trail setting when compared to the Proposed Action. For these reasons, the Different Waste Rock Disposal Facility Heights Alternative does not meet the selection criteria and has been eliminated from detailed consideration.

Different Facility Locations Outside the Project Area Alternative

This alternative considers different locations outside of the Project Area for major mine components (i.e., open pit, waste rock disposal, tailings facility), which would create the principle environmental impacts from the Proposed Action.

As part of the development of the Proposed Action by Eureka Moly, LLC, three basic tailings storage facility configurations were evaluated by Eureka Moly, LLC as follows: a) a tailings storage facility to the west of State Route 278 and east of the open pit; b) a tailings storage facility south of the Historic Trail; and c) a tailings storage facility to the east of State Route 278. The first configuration had three variations; the second and third configurations each had two variations. As a result, seven tailings storage facility configurations were considered by Eureka Moly, LLC during the development of their proposed Mount Hope Project. The configuration that was selected by Eureka Moly, LLC minimizes the potential impacts to State Route 278, Diamond Valley, deer migration routes, and the Pony Express Historic Trail.

The location of the proposed open pit is strictly dictated by the location of the identified ore deposit; therefore, no location alternatives for the open pit would be possible. The proposed location of the Mount Hope Project waste rock disposal facilities was selected by Eureka Moly, LLC after consideration of several operational, cost, and environmental factors that included the following: a) minimizing truck haul distance; b) minimizing the gradient from the open pit to the waste rock disposal facilities; c) adequate waste rock storage capacity; d) avoidance of sensitive environmental receptors; e) consolidation of mine facilities; and f) absence of suitable mining reserves underneath the waste rock disposal facilities.

Relocating either the waste rock disposal facilities or the tailings storage facilities as described in the Proposed Action to locations outside of the Project Area would not avoid any of the environmental effects, nor lessen below significance any of the significant environmental effects of the Proposed Action. This alternative would result in increased surface disturbance and air emissions associated with longer haul distances. The visual impacts under this alternative would not be lessened, but would be redistributed based on the location of the facilities. For these reasons, the Different Facility Locations Outside the Project Area Alternative does not meet the selection criteria and has been eliminated from detailed consideration.

Increased Ore Processing to Match the Mining Schedule Alternative

Under this alternative, the ore processing facility would process the ore at the same rate that it would be mined under the Proposed Action, thereby requiring construction of an ore processing facility with greater throughput capacity. As a result, the Mount Hope Project would be in operation for 32 years rather than 44 years under the Proposed Action. Under this alternative, there would be an approximately one to two percent increase in the number of employees above that expected under the Proposed Action. However, the length of employment for almost all the positions would only be 32 years.

This alternative would increase yearly air emissions during the life of the Mount Hope Project by approximately 50 percent and decrease employment opportunities due to the reduced life of the Mount Hope Project in comparison to the Proposed Action. Socioeconomic impacts, both positive and negative, would be reduced as compared to the Proposed Action because tax receipts and wages would occur over a shorter time period and not necessarily at a proportionally greater amount than under the Proposed Action. The demands on the local infrastructure made by employees and other Mount Hope Project-related individuals would be of shorter duration than the Proposed Action. Implementation of this alternative would not reduce any of the other environmental consequences of the Proposed Action and therefore, does not offer any environmental advantage in comparison with the Proposed Action. For these reasons, the Increased Ore Processing to Match the Mining Schedule Alternative does not meet the selection criteria and has been eliminated from detailed consideration.

Decreased Mining to Match the Ore Processing Schedule Alternative

Under this alternative, the mining rate would be decreased to match the ore processing rate under the Proposed Action. This alternative would decrease air emissions during the first 32 years of the Mount Hope Project due to the slower mining rates and increase air emissions during the last 12 years of the Mount Hope Project because mining would occur during these last 12 years of the ore processing in comparison with the Proposed Action. The alternative would extend and increase the ground water impacts due to the need to dewater the open pit for an additional 12 years, decrease employment opportunities due to the smaller mining operation, and change the socioeconomic impacts because of the smaller work force in comparison with the Proposed Action. The complete reclamation of the waste rock disposal facilities would be postponed. Implementation of this alternative would not result in any compelling environmental advantage relative to the Proposed Action. For these reasons, the Decreased Mining to Match the Ore Processing Schedule Alternative does not meet the selection criteria and has been eliminated from detailed consideration.

Reduced Project Alternative

A reduced Mount Hope Project would result in the construction of a smaller open pit and smaller associated facilities. As a result of the smaller scale operation under this alternative, there would be a reduction in the impacts to soils, vegetation, air quality, and ground water in comparison with the Proposed Action because there would be decreases in surface disturbance, air emissions, and water supply production. However, this alternative would increase the potential impacts to known mineral resources by not developing the defined mineral resource that would be mined under the Proposed Action, which would not be consistent with the national mineral policy outlined in the Mining and Mineral Policy Act of 1970 and the Materials and Mineral Policy, Research, and Development Act of 1980. This alternative does not meet the Purpose and Need of the Proposed Action as defined in Section 1.4 because the known mineral deposit would not be fully mined. For these reasons, the Reduced Project Alternative does not meet the criteria outlined above and has been eliminated from detailed consideration.

Different Facility Locations within the Project Area Alternative

This alternative considers different locations within the Project Area for the major mine facilities (i.e., open pit, tailings storage facilities, waste rock disposal facilities, and processing plant), which would create the principal impacts under the Proposed Action. As discussed above, an evaluation of different facility locations was conducted by Eureka Moly, LLC in their feasibility evaluation of the Mount Hope Project.

Analysis of different locations under this alternative is similar to that for the Different Facility Locations Outside the Project Area Alternative. This alternative does not meet the selection criteria and has been eliminated from detailed consideration because of the substantial logistical and transportation disadvantages, and because it would result in increased surface disturbance.

Different Powerline Alternative

Under this alternative, the Proposed Action would be developed; however, the connection to the regional power grid would be in a different location, as would the powerline route to the Mount Hope Project facilities.

A new substation for the Mount Hope Project would be located immediately south of the South Tailings Storage Facility where the NV Energy 345-kilovolt Falcon-Gondor powerline intersects the Project Area. The new substation would tie directly into the existing NV Energy 345-kilovolt Falcon-Gondor powerline. The substation would be designed to provide the power necessary for Mount Hope Project operation. From the new substation, the Mount Hope Project powerline would follow the same route through the Project Area as the powerline under the Proposed Action. This alternative would eliminate the need to construct a new powerline, adjacent to the Falcon-Gondor powerline from the existing Machacek Substation to the Project Area, through the western portion of Kobeh Valley.

Power for the Project was investigated by NV Energy in early 2007. NV Energy determined that two feasible power supply options existed for the Project. The 230-kV option with a tap at the Machacek Substation was selected over the 345-kV option. Design, cost, and reliability issues were considered. In addition, the 345-kV line serves as the "backbone" for electrical distribution in the area, which would make a tie-in problematic with respect to schedule and the duration of service interruption. As a result, the use of 345-kV line was determined to be technically infeasible. EML entered into a transmission agreement with NV Energy in late 2008 for 75 MW, substantiating that the 230-kV system at Machacek can provide sufficient power for the Project. The Project is located within the **NV Energy and** Mt. Wheeler Power service territory.

The viability of this alternative is uncertain because there may not be enough available power in the NV Energy powerline. This alternative does not meet the selection criteria and has been eliminated from detailed consideration because of the inability to define a viable power supply under this alternative.

Different Potentially Acid Generating Waste Rock Management Alternative

Under this alternative, the Proposed Action would be developed, except a different management technique would be used with the potentially acid generating waste rock. A single waste rock disposal facility would be constructed, and the potentially acid generating material would either be managed in isolation cells within the waste rock disposal facility or would be mixed with the other waste material throughout the life of the mining operation.

It is highly uncertain whether either of these management techniques would be successful in the management of the potentially acid generating material and thus minimize or eliminate the potential for the development of uncontrolled acid rock drainage or impacts to waters of the state. Segregation of potentially acid generating material has proven to provide better control of the reactive materials by reducing the size of the potential source area. The timing of the mining of the potentially acid generating versus other material would not allow for the mixing of the two types to minimize the potential for the migration of the leached constituents. This alternative does not meet the criteria outlined above and has been eliminated from detailed consideration because of the high degree of uncertainty and the likelihood for the development of uncontrolled acid rock drainage and potential impacts to waters of the state.

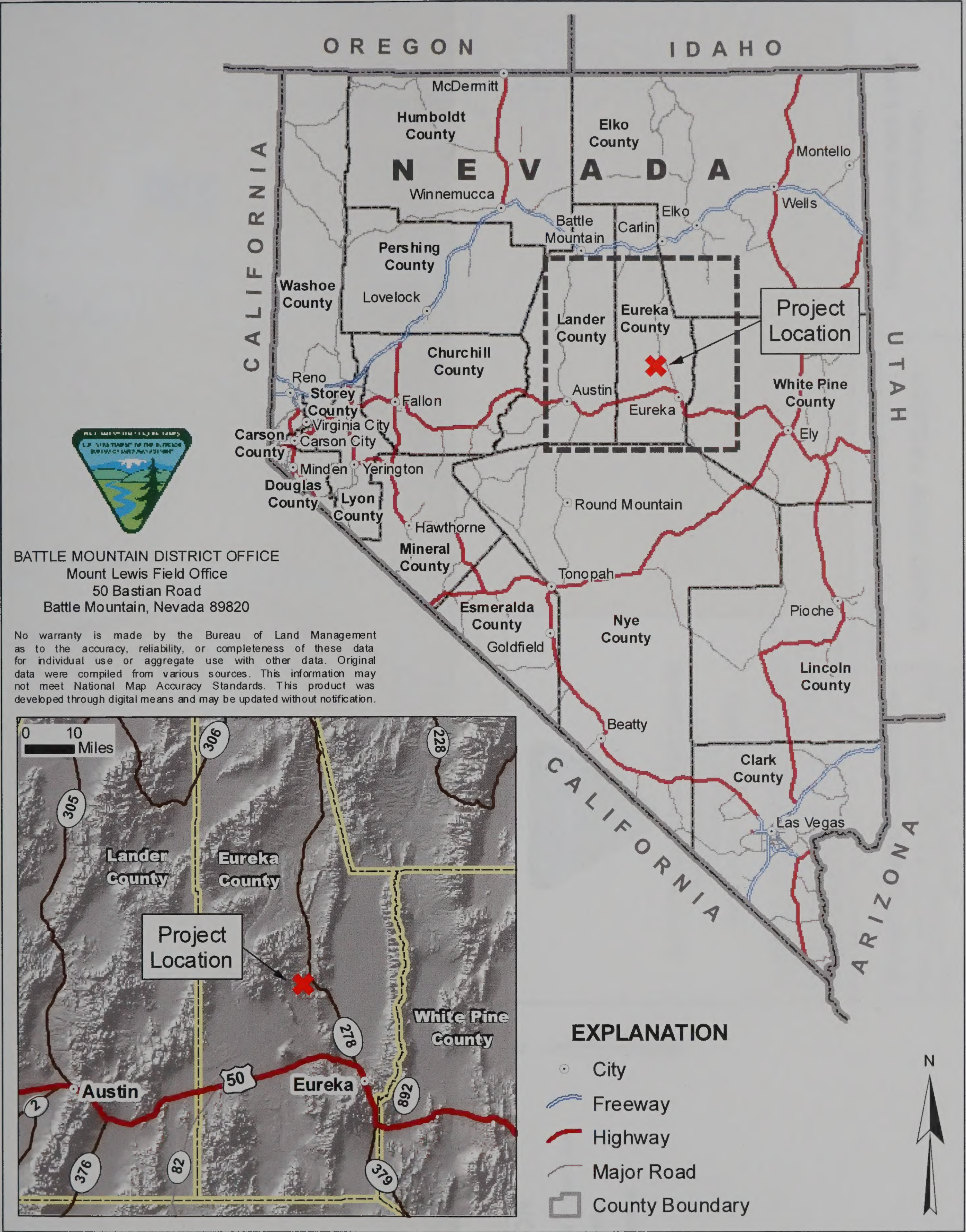
Important Issues and Impact Conclusions

The environmental consequences of, mitigation measures for, and level of significance of the environmental consequences before and after mitigation for the Proposed Action and the reasonable alternatives are summarized in Table ES-1.

Bureau of Land Management Preferred Alternative

Chapter 9, Section 9.2.7.3 of the Bureau of Land Management National Environmental Policy Act Handbook directs that an Environmental Impact Statement "…identify the agency's preferred alternative… For external proposals or applications, the proposed action may not turn out to be the BLM's preferred alternative, because the BLM will often present an alternative that would incorporate specific terms and conditions on the applicant."

Thus, the Bureau of Land Management has selected a Preferred Alternative based on the analysis in this **Final** Environmental Impact Statement; this Preferred Alternative is the alternative that best fulfills the agency's statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors. The Bureau of Land Management has determined that the Preferred Alternative is the Proposed Action as outlined in Chapter 2 of the **Final** Environmental Impact Statement, with the inclusion of the identified mitigation measures to the Proposed Action as specified in Chapter 3 of the **Final** Environmental Impact Statement.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IDAHO
NEVADA
CALIFORNIA
UTAH
ARIZONA
McDermitt
Humboldt County
Elko County
Montello
Winnemucca
Wells
Elko
Battle Mountain
Carlin
Pershing County
Washoe County
Lovelock
Lander County
Eureka County
Project Location
Churchill County
Reno
Storey County
Fallon
Austin
Eureka
White Pine County
Ely
Virginia City
Carson County
Carson City
Minden
Yerington
Douglas County
Lyon County
Round Mountain
Hawthorne
Mineral County
Tonopah
Esmeralda County
Goldfield
Nye County
Pioche
Lincoln County
Beatty
Clark County
Las Vegas
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306
228
305
Lander County
Eureka County
Project Location
White Pine County
278
50
Austin
Eureka
2
892
376
82
379
EXPLANATION
City
Freeway
Highway
Major Road
County Boundary
N

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Battle Mountain, Nevada 89820

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Miles

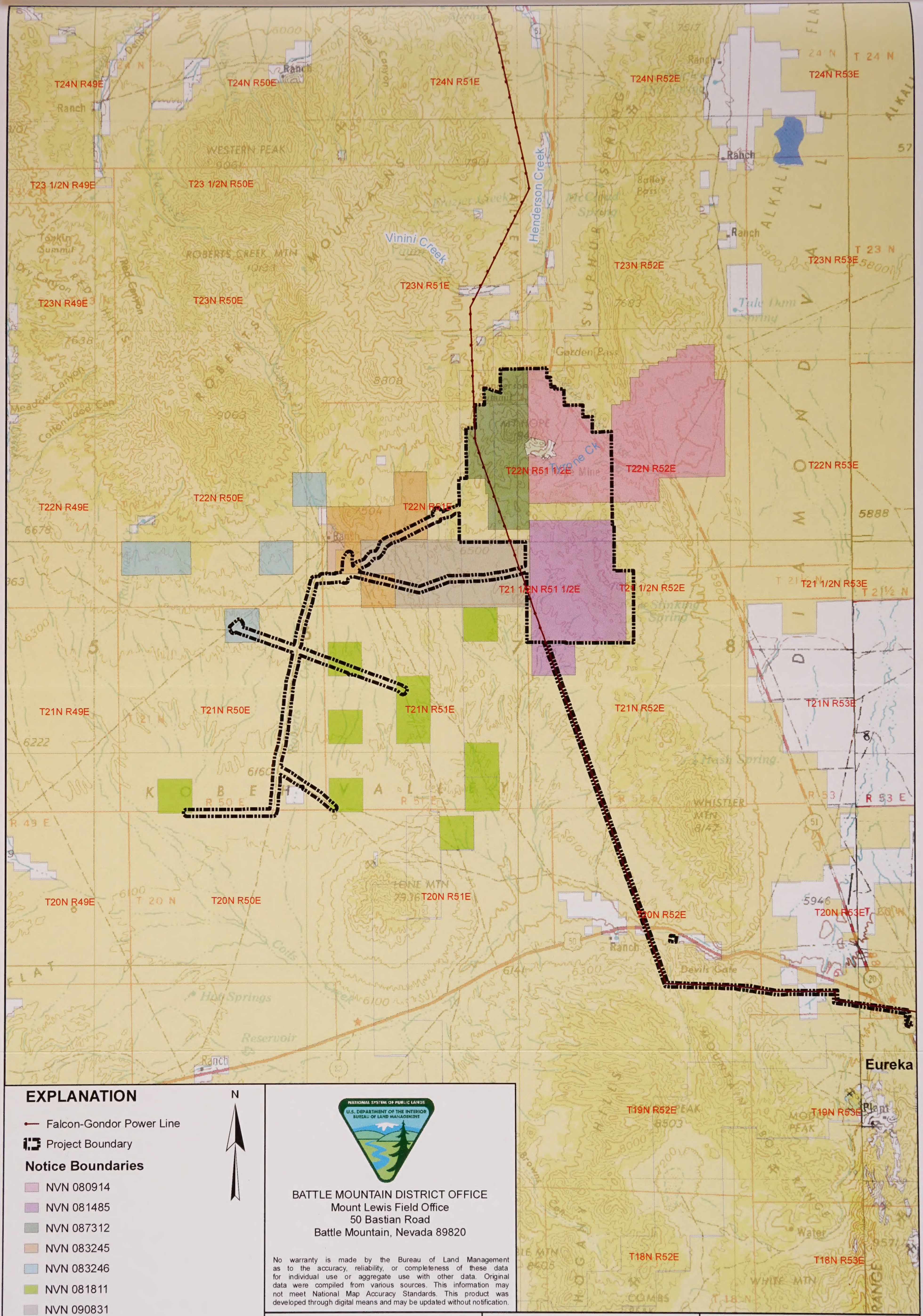
DESIGN: EMLLC
DRAWN: BVB/GSL
REVIEWED VS/RFD
SCALE:
DATE: 8/11/2011
FILE NAME: p1635_Fig1-1-1_GeneralLocationMap.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

General Location Map

Figure ES.1



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Western Peak
Roberts Creek Mtn
Roberts Mountains
Vinini Creek
Henderson Creek
Sulphur Spring
Garden Pass
Mt Hope
Tyrone Ck
Mine
Kobeh Valley
Lone Mtn
Whistler Mtn
Diamond Valley
Alkali
Devils Gate
Hot Springs
Reservoir
Ranch
Eureka
Tonkin Summit
Dry Canyon
Red Canyon
Meadow Canyon
Cottonwood Can
Bailey Pass
Tule Dam Spring
Stinking Spring
Flat
Hogan Hills
Mountain Range
Water
White Mtn
N

EXPLANATION

— Falcon-Gondor Power Line

▨ Project Boundary

Notice Boundaries

- ▨ NVN 080914
- ▨ NVN 081485
- ▨ NVN 087312
- ▨ NVN 083245
- ▨ NVN 083246
- ▨ NVN 081811
- ▨ NVN 090831

Land Status

- ▨ Public Land
- ☐ Private Land
- ▨ Water

NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
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0 1 2 3 4 5 Miles

BUREAU OF LAND MANAGEMENT

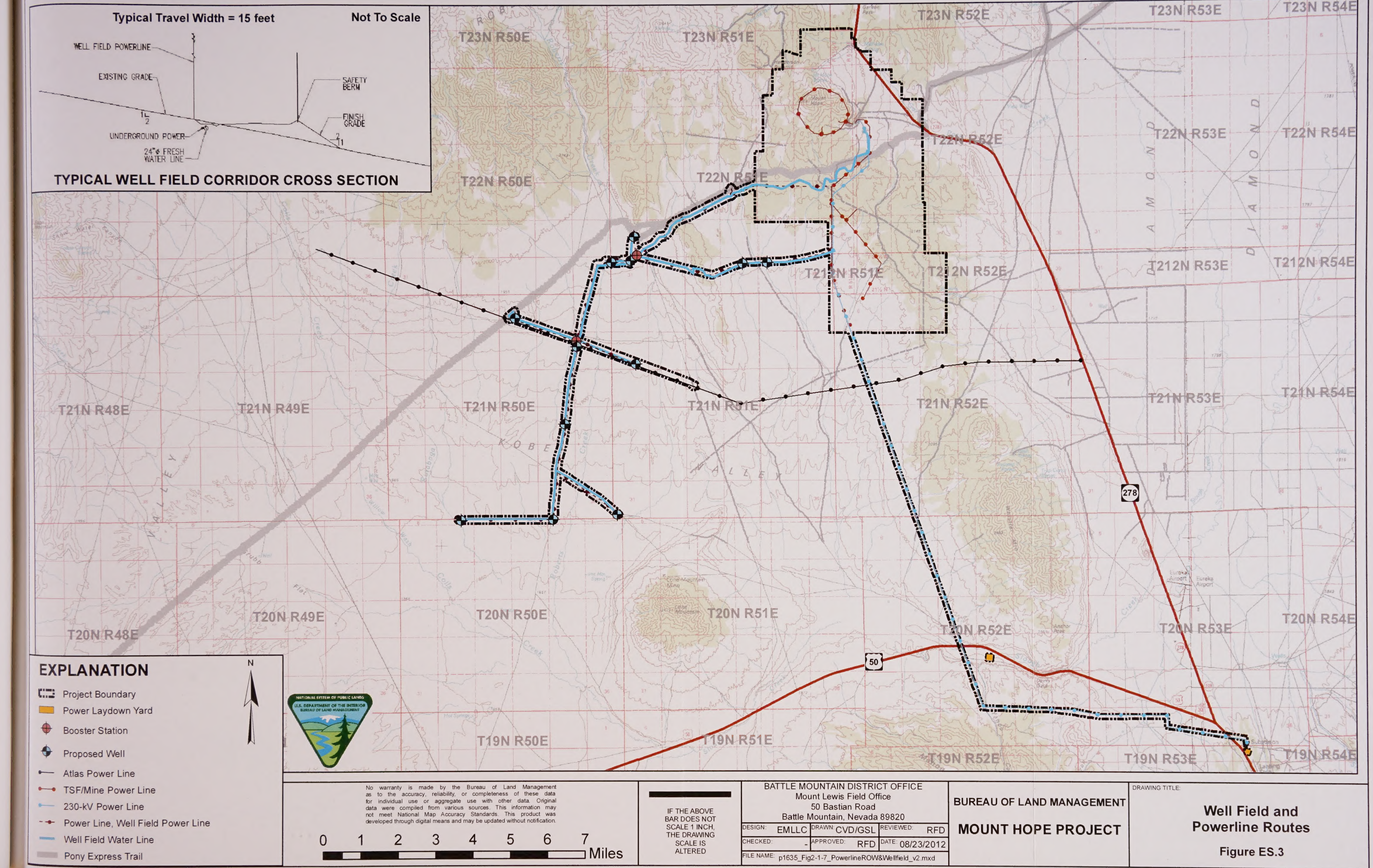
MOUNT HOPE PROJECT

DRAWING TITLE:

Project Area and Land Ownership

Figure ES.2

DESIGN: EMLLC
DRAWN: CVD/GSL
REVIEWED: RFD
CHECKED: -
APPROVED: RFD
DATE: 08/15/2012
FILE NAME: p1635_Fig1-1-2_ProjectArea&LandOwnership_v3.mxd


Typical Travel Width = 15 feet
Not To Scale
WELL FIELD POWERLINE
EXISTING GRADE
SAFETY BERM
FINISH GRADE
UNDERGROUND POWER
24"ϕ FRESH WATER LINE
TYPICAL WELL FIELD CORRIDOR CROSS SECTION
T23N R50E
T23N R51E
T23N R52E
T23N R53E
T23N R54E
T22N R50E
T22N R51E
T22N R52E
T22N R53E
T22N R54E
T212N R51E
T212N R52E
T212N R53E
T212N R54E
T21N R48E
T21N R49E
T21N R50E
T21N R51E
T21N R52E
T21N R53E
T21N R54E
T20N R48E
T20N R49E
T20N R50E
T20N R51E
T20N R52E
T20N R53E
T20N R54E
T19N R50E
T19N R51E
T19N R52E
T19N R53E
T19N R54E
KOBE VALLEY
DIAMOND
278
50
EXPLANATION
N
Project Boundary
Power Laydown Yard
Booster Station
Proposed Well
Atlas Power Line
TSF/Mine Power Line
230-kV Power Line
Power Line, Well Field Power Line
Well Field Water Line
Pony Express Trail
0 1 2 3 4 5 6 7 Miles

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

DESIGN: EMLLC	DRAWN: CVD/GSL	REVIEWED: RFD
CHECKED: -	APPROVED: RFD	DATE: 08/23/2012
FILE NAME: p1635_Fig2-1-7_PowerlineROW&Wellfield_v2.mxd		

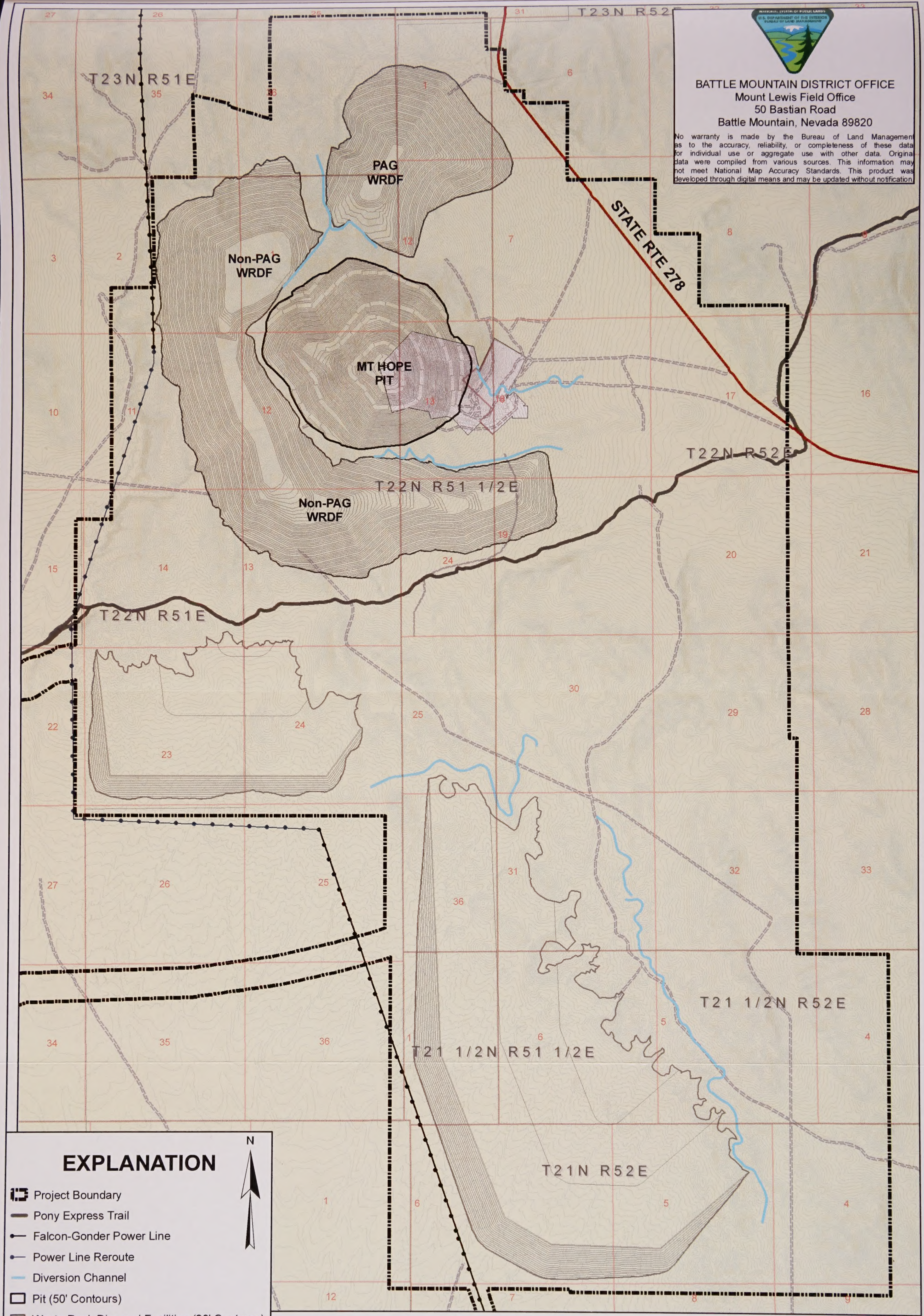
BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Well Field and Powerline Routes

Figure ES.3


T23N R51E
T23N R52E
PAG WRDF
Non-PAG WRDF
MT HOPE PIT
Non-PAG WRDF
STATE RTE 278
T22N R51 1/2E
T22N R52E
T22N R51E
T21 1/2N R52E
T21 1/2N R51 1/2E
T21N R52E
N
0
0.5
1
Miles

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EXPLANATION

- Project Boundary
- Pony Express Trail
- Falcon-Gonder Power Line
- Power Line Reroute
- Diversion Channel
- ☐ Pit (50' Contours)
- ☐ Waste Rock Disposal Facilities (20' Contours)
- ☐ Tailing Storage Facilities (20' Contours)

Land Status

- 🟨 Bureau of Land Management
- ☐ Private

DESIGN: EMLLC	DRAWN: CVD/GSL	REVIEWED: RFD	
CHECKED: -	APPROVED: RFD	DATE: 07/06/2012	
FILE NAME: p1635_Fig2-1-18_PostMiningTopography.mxd			

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Post Mining Topography (Year 80 and Beyond)

Figure ES.4

Table ES-1: Summary of Potential Environmental Effects, Mitigation Measures, Residual Impacts, and Effectiveness of Mitigation

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
WATER RESOURCES - WATER QUANTITY					
Issue:	Erosion, Sedimentation, and Flooding within Drainages				
	Page 3-74 through 3-74	**Page 3-121 through 3-121**	**Page 3-128 through 3-133**	**Page 3-147 through 3-147**	**Page 3-154 through 3-154**
Impact:	**Impact 3.2.3.3-1:** Grading, earth moving, diversion of drainages, and placement of fill could accelerate erosion and sedimentation, and alter surface water flood runoff patterns during mining and post-closure.	**Impact 3.2.3.4-1:** Grading, earth moving, diversion of drainages, and placement of fill could accelerate erosion and sedimentation, and alter surface-water flood runoff patterns in the future.	**Impact 3.2.3.5-1:** Grading, earth moving, diversion of drainages, and placement of fill could accelerate erosion and sedimentation and alter surface-water flood runoff patterns during mining and post-closure.	**Impact 3.2.3.6-1:** Grading, earth moving, diversion of drainages, and placement of fill could accelerate erosion and sedimentation and alter surface water flood runoff patterns during mining and post-closure.	**Impact 3.2.3.7-1:** Grading, earth moving, diversion of drainages, and placement of fill could accelerate erosion and sedimentation and alter surface-water flood runoff patterns during mining and post-closure.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
Issue:	Effects of Ground Water Drawdown on Streams, Springs, and Surface Water Resources				
	Page 3-88 through 3-90	**Page 3-121 through 3-121**	**Page 3-133 through 3-137**	**Page 3-147 through 3-150**	**Page 3-163 through 3-174**
Impact:	**Impact 3.2.3.3-2**: The ground water drawdown under the Proposed Action is predicted to be more than ten feet for two perennial stream segments (Roberts Creek and South Fork of Henderson Creek) and at 22 perennial or potentially perennial spring sites (Table 3.2-8) for varying periods of time up to at least 400 years after the end of the mining and milling operations. Other individual streams and springs outside of the model predictions could also be impacted.	**Impact 3.2.3.4-2:** The future ground water drawdown (relative to existing conditions in 2009) is predicted to be more than ten feet at one spring site and portions of five intermittent and ephemeral drainages in the Bobcat Ranch area, and at numerous spring sites and stream drainages in the southern part of Diamond Valley by the end of Year 2055. Other individual streams and springs outside of the model predictions could also be impacted.	**Impact 3.2.3.5-2:** The ground water drawdown is predicted to be more than ten feet for two perennial stream segments (Roberts Creek and South Fork of Henderson Creek) and at 20 perennial or potentially perennial spring sites (Table 3.2-8) for varying periods of time up to at least 400 years after the end of mining and milling operations. Other individual streams and springs outside of the model predictions could also be impacted.	**Impact 3.2.3.6-2:** The ground water drawdown is predicted to be more than ten feet for two perennial stream segments (Roberts Creek and South Fork of Henderson Creek) and at 22 perennial or potentially perennial spring sites (Table 3.2-8) for varying periods of time up to at least 400 years after the end of mining and milling operations. Other individual streams and springs outside of the model predictions could also be impacted.	**Impact 3.2.3.7-2:** The ground water drawdown is predicted to be more than ten feet for two perennial stream segments (Roberts Creek and South Fork of Henderson Creek) and at 29 perennial or potentially perennial spring sites (Tables 3.2-8 and 3.2-17) for varying periods of time up to at least 400 years after the end of mining and milling operations. Other individual streams and springs outside of the model predictions could also be impacted.
Significance of the Impact:	**Significance of the Impact:** The impacts are potentially significant at the two stream segments and 22 springs discussed above. Although significant impacts are not predicted to occur in the other individual streams or springs in the HSA due to the Proposed Action, the uncertainty of predicting impacts to streams and springs indicates a need for operational monitoring and mitigation measures to be implemented. If monitoring, which has been incorporated into the mitigation measure, indicates that there are reduced flows in perennial stream segments or springs that the BLM determines can be attributed to the mining operation, then specific mitigation would be implemented, as described below. Potential adverse effects to surface water rights would be mitigated under NDWR jurisdiction.	**Significance of the Impact:** Impacts associated with the No Action Alternative are considered significant; however, these impacts are not under BLM jurisdiction and no mitigation is proposed (see Section 3.26 of this EIS).	**Significance of the Impact:** The impacts are potentially significant at the two stream segments and 20 springs mentioned above. Although significant impacts are not predicted to occur in the other individual streams or springs in the HSA, the uncertainty of predicting impacts to streams and springs indicates a need for operational monitoring and mitigation measures to be implemented. If there are reduced flows in perennial stream segments or springs, based on monitoring, which is incorporated into the mitigation measure (that the BLM determines can be attributed to the mining operation), then specific mitigation would be implemented as described below. Potential adverse effects to surface water rights would be mitigated under NDWR jurisdiction.	**Significance of the Impact:** The impacts are potentially significant at the two stream segments and 22 springs mentioned above. Although significant impacts are not predicted to occur in the other individual streams or springs in the HSA, the uncertainty of predicting impacts to streams and springs indicates a need for operational monitoring and mitigation measures to be implemented. If reduced flows in perennial stream segments or springs, based on monitoring , which is incorporated into the mitigation measure (that the BLM determines can be attributed to the mining operation), then specific mitigation would be implemented, as described below. In addition, potential adverse effects to surface water rights would be mitigated under NDWR jurisdiction.	**Significance of the Impact:** The impacts are potentially significant at the two stream segments and 29 springs mentioned above. Although significant impacts are not predicted to occur in the other individual streams or springs in the HSA, the uncertainty of predicting impacts to streams and springs indicates a need for operational monitoring and mitigation measures to be implemented. If reduced flows in perennial stream segments or springs, based on monitoring, which is incorporated into the mitigation measure (that the BLM determines can be attributed to the mining operation), then specific mitigation would be implemented, as described below. Potential adverse effects to surface water rights would be mitigated under NDWR jurisdiction.
Mitigation Measure:	**Mitigation Measure 3.2.3.3-2a:** Specific mitigation for the two perennial stream segments and 22 perennial or potentially perennial spring sites are outlined in Table 3.2-9. Figure 3.2.21 shows the anticipated location for the components of the facilities necessary to implement the mitigation measures outlined in Table 3.2-9. Implementation of any of the specific mitigation outlined in Table 3.2-9 for springs located on private land would be subject to the authorization of the private land owner. The site-specific evaluation of the effectiveness of this specific mitigation for each identified surface water resource within the mine-related ground water drawdown area is presented in Table 3.2-9. The site-specific measures include one or more methods identified in Mitigation Measure 3.2.3.3-2b. Similar methods (as identified in Table 3.2-9) would also be applied to streams and springs not identified in this analysis, if monitoring indicates that there are impacts that the BLM determines can be attributed to the mining operation. Implementation of the mitigation outlined in Table 3.2-9 would result in up to approximately 37.2 acres of additional surface disturbance associated with road and pipeline construction and maintenance, as well as the need for approximately 302 acre-feet of water that would at least initially come from EML's existing water rights if additional water rights have not yet been secured. This specific mitigation would be implemented, as determined by the BLM, based on the results of the monitoring that is also outlined in this mitigation measure. EML would implement the water monitoring provisions outlined in Section 2.1.15 and Appendix C to track the drawdown associated with the open pit dewatering and ground water production activities. In addition, EML would	N/A	**Mitigation Measure 3.2.3.5-2a:** Specific mitigation for the two perennial stream segments and 20 perennial or potentially perennial spring sites are outlined in Table 3.2-9. Figure 3.2.21 shows the anticipated location for the components of the facilities necessary to implement the mitigation measures outlined in Table 3.2-9. Implementation of any of the specific mitigation outlined in Table 3.2-9 for springs located on private land would be subject to the authorization of the private land owner. The site-specific evaluation of the effectiveness of this specific mitigation for each identified surface water resource within the mine-related ground water drawdown area is presented in Table 3.2-9. The site-specific measures include one or more methods identified in Mitigation Measure (3.2.3.5-2b). Similar methods (as identified in Table 3.2-9) would also be applied to streams and springs not identified in this analysis, if monitoring indicates that there are impacts that the BLM determines can be attributed to the mining operation. Implementation of the mitigation outlined in Table 3.2-9 would result in up to approximately 29.8 acres of additional surface disturbance associated with the pipeline construction and maintenance, as well as the need for approximately 302 acre-feet of water that would at least initially come from EML's existing water rights if additional water rights have not yet been secured. This specific mitigation would be implemented, as determined by the BLM, based on the results of the monitoring outlined in this mitigation measure. EML would implement the water monitoring provisions outlined in Section 2.1.15 and Appendix C to track the drawdown associated with	**Mitigation Measure 3.2.3.6-2a:** Specific mitigation for the two perennial stream segments and 22 perennial or potentially perennial spring sites are outlined in Table 3.2-9. Figure 3.2.21 shows the anticipated location for the components of the facilities necessary to implement the mitigation measures outlined in Table 3.2-9. Implementation of any of the specific mitigation outlined in Table 3.2-9 for springs located on private land would be subject to the authorization of the private land owner. The site-specific evaluation of the effectiveness of this specific mitigation for each identified surface water resource within the mine-related ground water drawdown area is presented in Table 3.2-9. The site-specific measures include one or more methods identified in Mitigation Measure (3.2.3.6-2b). Similar methods (as identified in Table 3.2-9) would also be applied to streams and springs not identified in this analysis, if monitoring indicates that there are impacts that the BLM determines can be attributed to the mining operation. Implementation of the mitigation outlined in Table 3.2-9 would result in up to 37.2 acres of additional surface disturbance associated with the road and pipeline construction and maintenance, as well as the need for approximately 302 acre-feet of water that would at least initially come from EML's existing water rights if additional water rights have not yet been secured. The specific mitigation would be implemented, as determined by the BLM, based on the results of the monitoring that is also outlined in this mitigation measure. EML would implement the water monitoring provisions outlined in Section 2.1.15 and Appendix C to track the	**Mitigation Measure 3.2.3.7-2a:** Specific mitigation for the two perennial stream segments and 29 perennial or potentially perennial spring sites are outlined in Tables 3.2-9 and 3.2-18. Figure 3.2.32 shows the anticipated location for the components of the facilities necessary to implement the mitigation measures outlined in Table 3.2-9. Implementation of any of the specific mitigation outlined in Table 3.2-9 for springs located on private land would be subject to the authorization of the private land owner. The site-specific evaluation of the effectiveness of this specific mitigation for each identified surface water resource within the mine-related ground water drawdown area is presented in Table 3.2-9. The site-specific measures include one or more methods identified in Mitigation Measure (3.2.3.7-2b). Similar methods (as identified in Table 3.2-9) would also be applied to streams and springs not identified in this analysis, if monitoring indicates that there are impacts that the BLM determines can be attributed to the mining operation. Implementation of the mitigation outlined in these tables would result in a total of up to approximately 57.3 acres of surface disturbance associated with the pipeline construction and maintenance (i.e., up to approximately 37.2 acres of surface disturbance associated with the mitigation for the 22 springs outlined in Section 3.2.3.3 and up to approximately 20.1 acres associated with the mitigation for the seven additional springs potentially impacted by this alternative), as well as the need for approximately 313 acre-feet of water that would at least initially come from EML's existing water rights if additional water rights have not yet been

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	periodically update the ground water flow model as determined by the BLM. EML would be responsible for monitoring and annual reporting of changes in ground water levels and surface water flows prior to and during operation, and for a period of up to 30 years in the post mining and milling phase. The reports would be in a format and with a content that is acceptable to the BLM. The monitoring outlined in Appendix C and required in this mitigation measure would be used to document the effectiveness of the implemented specific mitigation activities. In addition, the BLM has the ability to require the implementation of additional mitigation measures if the initial implementation is unsuccessful. **Mitigation Measure 3.2.3.3-2b:** If monitoring (Mitigation Measure 3.2.3.3-2a) indicates that flow reductions of perennial surface waters are occurring and that these reductions are likely the result of mine-induced drawdown, the following measures would be implemented: 1. The BLM would evaluate the available information and determine whether mitigation is required. 2. If mitigation would be required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted perennial water resource(s). Potential adverse effects to water rights from the Project would be mitigated under NDWR jurisdiction, as well as potential need for additional BLM permit acquisition activities and NEPA analysis. The mitigation plan would be submitted to the BLM identifying the excess amount of drawdown or drawdown impacts to surface water resources. Mitigation would depend on the actual impacts, site-specific conditions, and historical use and could include a variety of measures (e.g., flow augmentation, on-site or off-site improvements). Methods to enhance or replace the impacted perennial water resources include, but are not limited to, the following: • Modification, including cessation, of pumping distribution in the water supply well field; • Injection to confine the drawdown cone; • Installation of a water-supply pump in an existing well (e.g., monitoring well); • Installation of a new water production well; • Piping from a new or existing source; • Installation of a guzzler; • Enhanced development of an existing seep or spring to promote additional flow; • Water hauling; • Removal of piñon-juniper in impacted watersheds; or • Fencing or other protective measures for an existing seep to maintain flow. 3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures. **Mitigation Measure 3.2.3.3-2c**: The numerical ground water flow modeling indicates that some impacts to springs may occur after the end of mining and milling operations, when some of the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the closure process consistent with regulations and policies using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. If the BLM determines that the Project impacts perennial stream segments or springs in this post-operational phase, mitigation consisting of one or both of the following measures would be required:		the open pit dewatering and ground water production activities. In addition, EML would periodically update the ground water flow as determined by the BLM. EML would be responsible for monitoring and annual reporting of changes in ground water levels and surface water flows prior to and during operation, and for a period of up to 30 years in the post-mining and milling phase. The reports would be in a format and with a content that is acceptable to the BLM. The monitoring outlined in Appendix C and required in this mitigation measure would be used to document the effectiveness of the implemented specific mitigation activities. In addition, the BLM has the ability to require the implementation of additional mitigation measures if the initial implementation is unsuccessful. **Mitigation Measure 3.2.3.5-2b**: If monitoring (Mitigation Measure 3.2.3.5-2a) indicates that flow reductions of perennial surface waters are occurring and that these reductions are likely the result of mine-induced drawdown, the following measures would be implemented: 1. The BLM would evaluate the available information and determine whether mitigation is required. 2. If mitigation would be required by the BLM for BLM-administered resources, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted perennial water resource(s). Potential adverse effects to surface water rights would be mitigated under NDWR jurisdiction, as well as potential need for additional BLM permit acquisition activities and NEPA analysis. The mitigation plan would be submitted to the BLM identifying the excess amount of drawdown or drawdown impacts to surface water resources. Mitigation would depend on the actual impacts, site-specific conditions, and historical use and could include a variety of measures (e.g., flow augmentation, on-site, or off-site improvements). Methods to enhance or replace the impacted perennial water resources include, but are not limited to, the following: • Modification, including cessation, of pumping distribution in the water supply well field; • Injection to confine the drawdown cone; • Installation of a water-supply pump in an existing well (e.g., monitoring well); • Installation of a new water production well; • Piping from a new or existing source; • Installation of a guzzler; • Enhanced development of an existing seep or spring to promote additional flow; • Water hauling; • Removal of piñon-juniper in impacted watersheds; or • Fencing or other protective measures for an existing seep to maintain flow. 3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures. **Mitigation Measure 3.2.3.5-2c**: The numerical ground water flow modeling indicates that some impacts to springs may occur after the end of mining and milling operations, when some of the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the closure process consistent with regulations and policy using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. If the BLM determines that the Project would	drawdown associated with the open pit dewatering and water production activities. In addition, EML would periodically update the ground water flow model as determined by the BLM. EML would be responsible for monitoring and annual reporting of changes in ground water levels and surface water flows prior to and during operation, and for a period of up to 30 years in the post mining and milling phase. The reports would be in a format and with a content that is acceptable to the BLM. The monitoring outlined in Appendix C and required in this mitigation measure would be used to document the effectiveness of the implemented specific mitigation activities. In addition, the BLM has the ability to require the implementation of additional mitigation measures if the initial implementation is unsuccessful. **Mitigation Measure 3.2.3.6-2b:** If monitoring (Mitigation Measure 3.2.3.6-2a) indicates that flow reductions of perennial surface waters are occurring and that these reductions are likely the result of mine-induced drawdown, the following measures would be implemented: 1. The BLM would evaluate the available information and determine whether mitigation is required. 2. If mitigation would be required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted perennial water resource(s). Potential adverse effects to water rights would be mitigated under NDWR jurisdiction, as well as potential need for additional BLM permit acquisition activities and NEPA analysis. The mitigation plan would be submitted to the BLM identifying the excess amount of drawdown or drawdown impacts to surface water resources. Mitigation would depend on the actual impacts, site-specific conditions, and historical use and could include a variety of measures (e.g., flow augmentation, on-site or off-site improvements). Methods to enhance or replace the impacted perennial water resources include, but are not limited to the following: • Modification, including cessation, of pumping distribution in the water supply well field; • Injection to confine the drawdown cone; • Installation of a water-supply pump in an existing well (e.g., monitoring well); • Installation of a new water production well; • Piping from a new or existing source; • Installation of a guzzler; • Enhanced development of an existing seep or spring to promote additional flow; • Water hauling; • Removal of piñon-juniper in impacted watersheds; or • Fencing or other protective measures for an existing seep to maintain flow. 3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures. **Mitigation Measure 3.2.3.6-2c:** The numerical ground water flow modeling indicates that some impacts to springs may occur after the end of mining and milling operations, when some of the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the closure process consistent with regulations and policies using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. If the BLM determines that the Project would impact perennial stream segments or spring sites in this	secured. This specific mitigation would be implemented, as determined by the BLM, based on the results of the monitoring that is also outlined in this mitigation measure. EML would implement the water monitoring provisions outlined in Section 2.1.15 and Appendix C to track the drawdown associated with the open pit dewatering and water production activities. In addition, EML would update the ground water flow model, as determined by the BLM. EML would be responsible for monitoring and annual reporting of changes in ground water levels and surface water flows prior to and during operation, and for a period of up to 30 years in the post mining and milling phase. The reports would be in a format and with a content that is acceptable to the BLM. The monitoring outlined in Appendix C and required in this mitigation measure would be used to document the effectiveness of the implemented specific mitigation activities. In addition, the BLM has the ability to require the implementation of additional mitigation measures if the initial implementation is unsuccessful. **Mitigation Measure 3.2.3.7-2b:** If monitoring (Mitigation Measure 3.2.3.7-2a) indicates that flow reductions of perennial surface waters are occurring and that these reductions are likely the result of mine-induced drawdown, the following measures would be implemented: 1. The BLM would evaluate the available information and determine whether mitigation is required. 2. If mitigation would be required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted perennial water resource(s). Potential adverse effects to water rights would be mitigated under NDWR jurisdiction, as well as potential need for additional BLM permit acquisition activities and NEPA analysis. The mitigation plan would be submitted to the BLM identifying the excess in drawdown or drawdown impacts to surface water resources. Mitigation would depend on the actual impacts, site-specific conditions, and historical use and could include a variety of measures (e.g., flow augmentation, on-site or off-site improvements). Methods to enhance or replace the impacted perennial water resources include, but are not limited to, the following: • Modification, including cessation, of pumping distribution in the water supply well field; • Injection to confine the drawdown cone; • Installation of a water-supply pump in an existing well (e.g., monitoring well); • Installation of a new water production well; • Piping from a new or existing source; • Installation of a guzzler; • Enhanced development of an existing seep or spring to promote additional flow; • Water hauling; • Removal of Piñon-Juniper in impacted watersheds; or • Fencing or other protective measures for an existing seep to maintain flow. 3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures. **Mitigation Measure 3.2.3.7-2c:** The numerical ground water flow modeling indicates that some impacts to springs may occur after the end of mining and milling operations, when some of the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the closure process consistent with regulations and policies using the accumulated field data for pumping rates, consumptive use,

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	1. Installation of a well and pump at affected stream or spring locations to restore the historic yield of the affected surface water resource. 2. Posting of an additional financial guarantee to provide for potentially affected water supplies in the future.		impact perennial stream segments or spring sites in this post-operational phase, mitigation consisting of one or both of the following measures would be required: 1. Installation of a well and pump at affected stream or spring locations to restore the historic yield of the affected surface water resource. 2. Posting of an additional financial guarantee to provide for potentially affected water supplies in the future.	post-operational phase, mitigation consisting of one or both of the following measures would be required: 1. Installation of a well and pump at affected stream or spring locations to restore the historic yield of the affected surface water resource. 2. Posting of an additional financial guarantee to provide for potentially affected water supplies in the future.	and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. If the BLM determines that the Project would impact perennial stream segments or spring sites in this post-operational phase, mitigation consisting of one or both of the following measures would be required: 1. Installation of a well and pump at affected stream or spring locations to restore the historic yield of the affected surface water resource. 2. Posting of an additional financial guarantee to provide for potentially affected water supplies in the future.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Mitigation would be designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. The effectiveness of Mitigation Measure 3.2.3.3-2c, if implemented, is less certain since it would be many decades in the future. If initial implementation was not successful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. However, this type of mitigation has been proven to be effective and if measures used in Mitigation Measure 3.2.3.3-2b are implemented, then the measure should be effective at mitigating the impacts from reduced surface water flows. Over a long period of time (tens to hundreds of years) the effects to most surface water flows would diminish; however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity.	N/A	**Effectiveness of Mitigation and Residual Effects:** Mitigation would be designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. The effectiveness of Mitigation Measure 3.2.3.5-2c, if implemented, is less certain since the mitigation would be many decades in the future. If initial implementation was not successful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. However, this type of mitigation has been proven to be effective and if measures used in Mitigation Measure 3.2.3.5-2b are implemented, then the measure should be effective at mitigating the impacts from reduced surface water flows. Over a long period of time (tens to hundreds of years) the effects to most surface water flows would diminish; however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity.	**Effectiveness of Mitigation and Residual Effects:** Mitigation would be designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. The effectiveness of Mitigation Measure 3.2.3.6-2c, if implemented, is less certain since it would be many decades in the future. If initial implementation was not successful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. However, this type of mitigation has been proven to be effective and if measures used in Mitigation Measure 3.2.3.6-2b are implemented, then the measure should be effective at mitigating the impacts from reduced surface water flows. Over a long period of time (tens to hundreds of years) the effects to most surface water flows would diminish; however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity.	**Effectiveness of Mitigation and Residual Effects:** Mitigation would be designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. The effectiveness of Mitigation Measure 3.2.3.7-2c, if implemented, is less certain since it would occur many decades in the future. If initial implementation was not successful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. However, this type of mitigation has been proven to be effective and if measures used in Mitigation Measure 3.2.3.7-2b are implemented, then the measure should be effective at mitigating the impacts from reduced surface water flows. Over a long period of time (tens to hundreds of years) the effects to most surface water flows would diminish; however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity.
Issue:	Lowering of the Water Table				
	Page 3-108 through 3-112	**Page 3-122 through 3-122**	**Page 3-138 through 3-142**	**Page 3-150 through 3-152**	**Page 3-174 through 3-176**
Impact:	**Impact 3.2.3.3-3:** The ground water drawdown is predicted to exceed ten feet at the locations of seven wells with associated active ground water use with water rights.	**Impact 3.2.3.4-3:** The ground water drawdown is predicted to exceed ten feet at the locations of numerous active ground water rights controlled by third parties in the Bobcat Ranch area of Kobeh Valley and in the southern part of Diamond Valley by the end of Year 2055. None of these locations are predicted to be impacted by the Proposed Action, the Partial Backfill Alternative, or the Off-Site Transfer of Ore Concentrate for Processing Alternative.	**Impact 3.2.3.5-3:** The ground water drawdown is predicted to exceed ten feet at the locations of seven wells with associated active ground water use with water rights.	**Impact 3.2.3.6-3:** The ground water drawdown is predicted to exceed ten feet at the locations of seven wells with associated with active ground water use with water rights.	**Impact 3.2.3.7-3:** The ground water drawdown is predicted to exceed ten feet at the locations of seven wells with associated active ground water use with water rights, which is similar to those under the Proposed Action.
Significance of the Impact:	**Significance of the Impact:** Impacts to the seven wells with associated ground water use with water rights listed in Table 3.2-10 are potentially significant until such time as the ground water level recovers to less than ten feet of drawdown, which is predicted to be less than 100 years post-Project in all cases. The impacts would become less than significant after implementation of the mitigation measures described below. Potential adverse effects to ground water rights would be mitigated under NDWR. Therefore, no mitigation measures are proposed by the BLM for ground water rights. Section 3.26 includes suggested mitigation outside the BLM's jurisdiction for water rights.	**Significance of the Impact:** Impacts associated with the No Action Alternative are considered significant; however, these impacts are not under BLM jurisdiction and no mitigation is proposed (see Section 3.26 of this EIS).	**Significance of the Impact:** Impacts to the seven wells with associated active ground water use with water rights listed in Table 3.2-10 are potentially significant until such time as the ground water level recovers to less than ten feet of drawdown, which is predicted to be less than 100 years post-Project in all cases. The impacts would become less than significant after implementation of the mitigation measures described below. Potential adverse effects to ground water rights would be mitigated under NDWR jurisdiction. Therefore no mitigation measures are proposed by the BLM for ground water rights. Section 3.26 includes suggested mitigation outside the BLM's jurisdiction for water rights.	**Significance of the Impact:** Impacts to the seven wells with associated active ground water use with water rights listed in Table 3.2-10 are potentially significant until such time as the ground water level recovers to less than ten feet of drawdown, which is predicted to be less than 100 years post-Project in all cases. The impacts would become less than significant after implementation of the mitigation measures described below. Potential adverse effects to ground water rights would be mitigated under NDWR jurisdiction. Therefore, no mitigation measures are proposed by the BLM for ground water rights. Section 3.26 includes suggested mitigation outside the BLM's jurisdiction for water rights.	**Significance of the Impact:** Impacts to the seven wells with associated active ground water use with water rights listed in Table 3.2-10 are potentially significant until such time as the ground water level recovers to less than ten feet of drawdown, which is predicted to be less than 100 years post-Project in all cases. The impacts would become less than significant after implementation of the mitigation measures described below. Potential adverse effects to ground water rights would be mitigated under NDWR jurisdiction. Therefore, no mitigation measures are proposed by the BLM for ground water rights. Section 3.26 includes suggested mitigation outside the BLM's jurisdiction for water rights.
Mitigation Measure:	**Mitigation Measure 3.2.3.3-3a:** For the seven wells with associated active ground water use with water rights EML would assess the distance of the screened interval and the pumping below the ground water table. If that difference is greater than maximum predicted drawdown, then EML would pay the water right holder for the increase in pumping costs based on historical usage. If the difference is greater than ten feet, then EML would pay for either the lowering of the pump to a depth greater than the maximum drawdown in the well, or the completion of a new well with the screened depth greater than the maximum predicted drawdown and pay the water right holder for the increase in pumping costs based	N/A	**Mitigation Measure 3.2.3.5-3a:** For the seven wells with associated active ground water use with water rights EML would assess the distance of the screened interval and the pumping below the ground water table. If that difference is greater than maximum predicted drawdown, then EML would pay the water right holder for the increase in pumping costs based on historical usage. If the difference is greater than ten feet, then EML would pay for either the lowering of the pump to a depth greater than the maximum drawdown in the well, or the completion of a new well with the screened depth greater than the maximum predicted drawdown and pay the water right	**Mitigation Measure 3.2.3.6-3a:** For the seven wells with associated active ground water use with water rights EML would assess the distance of the screened interval and the pumping below the ground water table. If that difference is greater than maximum predicted drawdown, then EML would pay the water right holder for the increase in pumping costs based on historical usage. If the difference is greater than ten feet, then EML would pay for either the lowering of the pump to a depth greater than the maximum drawdown in the well, or the completion of a new well with the a screened depth greater than the maximum predicted drawdown and pay the water right	**Mitigation Measure 3.2.3.7-3a:** For the seven wells with associated active ground water use with water rights EML would assess the distance of the screened interval and the pumping below the ground water table. If that difference is greater than maximum predicted drawdown, then EML would pay the water right holder for the increase in pumping costs based on historical usage. If the difference is greater than ten feet, then EML would pay for either the lowering of the pump to a depth greater than the maximum drawdown in the well, or the completion of a new well with the a screened depth greater than the maximum predicted drawdown and pay the water right

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	on historic usage. In addition, EML would implement the water monitoring provisions outlined in Section 2.1.15 and in Appendix C. If, through implementation of the water monitoring, it is determined that there are impacts to wells with associated active ground water use with water rights attributable to the Project, whether predicted or not, then the following mitigation measures would be implemented. **Mitigation Measure 3.2.3.3-3b:** If monitoring (Mitigation Measure 3.2.3.3-3a) indicates that mine-induced drawdown impacts a well with associated active water use with rights, the following measures would be implemented: 1. The BLM would evaluate the available information and determine whether mitigation is required. 2. If mitigation is required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted ground water. The mitigation plan would be submitted to the BLM identifying drawdown impacts to ground water resources. Mitigation would depend on the actual impacts and site-specific conditions and could include the following: • Lowering the pump in an existing well; • Deepening an existing well; • Drilling a new well for replacement of water supply; • Providing a replacement water supply of equivalent yield and general water quality; • Pay for any incremental increase in pumping costs. • Modifying the KVCWF pumping regime (well locations or rates) during operations to reduce drawdown in the area of the impacted ground water resources; • Infiltrating or injecting water during operations at strategic locations to limit drawdown propagation in certain areas. 3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures. **Mitigation Measure 3.2.3.3-3c**: For any significant impacts to wells with associated active ground water use with water rights that do not occur until after the end of mining and milling operations, the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the closure process consistent with regulations and policies using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. Wells with associated active ground water use with water rights not owned or controlled by EML that are indicated to be significantly impacted would then be mitigated by EML using one or more of the following measures, as directed by the BLM: 1. Installation of a deeper well and pump at affected locations to restore the historical yield of the well (including incremental increase in pumping costs). 2. Posting of a funding mechanism to provide for potential future impacts to potentially affected water sources.		holder for the increase in pumping costs based on historic usage. In addition, EML would implement the water monitoring provisions outlined in Section 2.1.15 and in Appendix C. If, through implementation of the water monitoring, it is determined that there are impacts to wells with associated active ground water use with water rights attributable to the Project, whether predicted or not, then the following mitigation measures would be implemented. The combined surface water and ground water monitoring results would be used to trigger the implementation of Mitigation Measure 3.2.3.5-3b. **Mitigation Measure 3.2.3.5-3b**: If monitoring (Mitigation Measure 3.2.3.5-3a) indicates that mine-induced drawdown impacts a well with associated active ground water use with water rights, the following measures would be implemented: 1. The BLM would evaluate the available information and determine whether mitigation is required. 2. If mitigation is required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted ground water. The mitigation plan would be submitted to the BLM identifying drawdown impacts to ground water resources. Mitigation would depend on the actual impacts and site-specific conditions and could include the following: • Lowering the pump in an existing well; • Deepening an existing well; • Drilling a new well for replacement of water supply; • Providing a replacement water supply of equivalent yield and general water quality; • Pay for any incremental increase in pumping costs; • Modifying the KVCWF pumping regime (well locations and/or rates) during operations to reduce draw down in the area of the impacted ground water resources; • Infiltrating or injecting water during operations at strategic locations to limit drawdown propagation in certain areas. 3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures. **Mitigation Measure 3.2.3.5-3c**: For any significant impacts to wells with associated active ground water use with water rights that do not occur until after the end of mining and milling operations, the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the closure process consistent with regulations and policies using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. Wells with associated active ground water use with water rights not owned or controlled by EML that are indicated to be significantly impacted would then be mitigated by EML using one or more of the following measures, as directed by the BLM or the appropriate regulatory agency: 1. Installation of a deeper well and pump at affected locations to restore the historical yield of the well (including incremental increase in pumping costs). 2. Posting of a funding mechanism to provide for potential future impacts to potentially affected water sources.	holder for the increase in pumping costs based on historic usage. In addition, EML would implement the water monitoring provisions outlined in Section 2.1.15 and Appendix C. If, through implementation, of the water monitoring it is determined that there are impacts to wells with associated active ground water use with water rights attributable to the Project, whether predicted or not, then the following mitigation measures would be implemented. The combined surface water and ground water monitoring results would be used to trigger the implementation of Mitigation Measure 3.2.3.6-3b. **Mitigation Measure 3.2.3.6-3b:** If monitoring (Mitigation Measure 3.2.3.6-3a) indicates that mine-induced drawdown impacts a well with associated active ground water use with water rights, the following measures would be implemented: 1. The BLM would evaluate the available information and determine whether mitigation is required. 2. If mitigation is required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted ground water. The mitigation plan would be submitted to the BLM identifying drawdown impacts to ground water resources. Mitigation would depend on the actual impacts and site-specific conditions and could include: • Lowering the pump in an existing well; • Deepening an existing well; • Drilling a new well for replacement of water supply; • Providing a replacement water supply of equivalent yield and general water quality; • Pay for any incremental increase in pumping costs; • Modifying the KVCWF pumping regime (well locations or rates) during operations to reduce draw down in the area of the impacted ground water resources; • Infiltrating or injecting water during operations at strategic locations to limit drawdown propagation in certain areas. 3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures. **Mitigation Measure 3.2.3.6-3c:** For any significant impacts to wells with associated active ground water use with water rights that do not occur until after the end of mining and milling operations, the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the final year of the Project using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. Wells with associated active ground water use with water rights that are not owned or controlled by EML that are indicated to be significantly impacted would then be mitigated by EML using one or more of the following measures, as directed by the NDWR, the BLM, or the appropriate regulatory agency: 1. Installation of a deeper well and pump at affected locations to restore the historical yield of the well (including incremental increase in pumping costs). 2. Posting of a funding mechanism to provide for potential future impacts to potentially affected water sources.	holder for the increase in pumping costs based on historic usage. In addition, EML would implement the water monitoring provisions outlined in Section 2.1.15 and Appendix C. If, through implementation of the water monitoring it is determined that there are impacts to wells with associated active ground water use with water rights attributable to the Project, whether predicted or not, then the following mitigation measures would be implemented. The combined surface water and ground water monitoring results would be used to trigger the implementation of Mitigation Measure 3.2.3.7-3b. **Mitigation Measure 3.2.3.7-3b:** If monitoring (Mitigation Measure 3.2.3.7-3a) indicates that mine-induced drawdown impacts a well with associated active ground water use with water rights, the following measures would be implemented: 1. The BLM would evaluate the available information and determine whether mitigation is required. 2. If mitigation is required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted ground water. The mitigation plan would be submitted to the BLM identifying drawdown impacts to ground water resources. Mitigation would depend on the actual impacts and site-specific conditions and could include the following: • Lowering the pump in an existing well; • Deepening an existing well; • Drilling a new well for replacement of water supply; • Providing a replacement water supply of equivalent yield and general water quality; • Pay for an incremental increase in pumping costs; • Modifying the KVCWF pumping regime (well locations or rates) during operations to reduce drawdown in the area of the impacted ground water resources; • Infiltrating or injecting water during operations at strategic locations to limit drawdown propagation in certain areas. 3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures. **Mitigation Measure 3.2.3.7-3c:** For any significant impacts to wells with associated active ground water use with water rights that do not occur until after the end of mining and milling operations, the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the final year of the Project using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. Wells with associated active ground water use with water rights that are not owned or controlled by EML that are indicated to be significantly impacted would then be mitigated by EML using one or more of the following measures, as directed by the NDWR, the BLM, or the appropriate regulatory agency: 1. Installation of a deeper well and pump at affected locations to restore the historical yield of the well (including incremental increase in pumping costs). 2. Posting of a funding mechanism to provide for potential future impacts to potentially affected water sources.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.2.3.3-3b and the use of any of the options outlined above would be effective at mitigating	N/A	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.2.3.5-3b and the use of any of the options outlined above would be effective at	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.2.3.6-3b and the use of any of the options outlined above would be effective at	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.2.3.7-3b and the use of any of the options outlined above would be effective at

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	the impacts to wells with associated active ground water use with water rights. Mitigation would be designed to address the specific ground water source that is affected, which enhances the effectiveness of the mitigation. Because the mitigation measures are specifically intended to directly address the impact by providing financial compensation or ensuring that the water is made available, and because the measures would be reviewed and assessed by the BLM, these mitigation measures are expected to be effective. If initial implementation were unsuccessful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. Any residual effects to ground water uses would be fully mitigated and over a long period of time (tens to hundreds of years) the drawdown effects would fully diminish, except in the vicinity of the open pit where the effects would be in perpetuity.		mitigating the impacts to wells with associated active ground water use with water rights. Mitigation would be designed to address the specific ground water source that is affected, which enhances the effectiveness of the mitigation. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by providing financial compensation or ensuring that the water is made available, and because the measures would be reviewed and assessed by the BLM. If initial implementation was not successful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. Any residual effects to ground water rights would be fully mitigated and over a long period of time (tens to hundreds of years) the drawdown effects would fully diminish, except in the vicinity of the open pit where the effects would be in perpetuity.	mitigating the impacts to wells with associated active ground water use with water rights. Mitigation would be designed to address the specific ground water source that is affected, which enhances the effectiveness of the mitigation. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by providing financial compensation or ensuring that the water is made available, and because the measures would be reviewed and assessed by the BLM. If initial implementation were unsuccessful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. Any residual effects to ground water uses would be fully mitigated and over a long period of time (tens to hundreds of years) the drawdown effects would fully diminish, except in the vicinity of the open pit where the effects would be in perpetuity.	mitigating the impacts to wells with associated active ground water use with water rights. Mitigation would be designed to address the specific ground water source that is affected, which enhances the effectiveness of the mitigation. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by providing financial compensation or ensuring that the water is made available, and because the measures would be reviewed and assessed by the BLM. If initial implementation was not successful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. Any residual effects to ground water rights would be mitigated and over a long period of time (tens to hundreds of years) the drawdown effects should fully diminish, except in the vicinity of the open pit where the effects would be in perpetuity.
	Page 3-115 through 3-115	**Page 3-122 through 3-125**	**Page 3-144 through 3-144**	**Page 3-152 through 3-152**	**Page 3-178 through 3-178**
Impact:	**Impact 3.2.3.3-4:** Ground water flow modeling indicates that there could be up to approximately a 25 percent decrease in ET of ground water in Kobeh Valley due to phreatophyte plant reduction resulting from temporary mine-induced drawdown.	**Impact 3.2.3.4-4:** Ground water flow modeling indicates that there would be a continued decrease in ET of ground water in Diamond Valley resulting from expanded drawdown associated with continued agricultural pumping.	**Impact 3.2.3.5-4**: Ground water flow modeling indicates that there could be up to an approximately 25 percent decrease in ET of ground water in Kobeh Valley due to a change in phreatophyte composition and percent cover resulting from temporary mine-induced drawdown.	**Impact 3.2.3.6-4:** Ground water flow modeling indicates that there could be up to an approximately 25 percent decrease in ET of ground water in Kobeh Valley due to a change in phreatophyte composition and percent cover resulting from temporary mine-induced drawdown, which would partially offset the mine-related consumptive use of water from the Kobeh Valley basin during mining and milling operations.	**Impact 3.2.3.7-4:** Ground water flow modeling indicates that there could be up to approximately 25 percent decrease in ET of ground water in Kobeh Valley due to a change in phreatophyte composition and percent cover resulting from temporary mine-induced drawdown.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** Impacts associated with the No Action Alternative are considered significant; however, these impacts are not under BLM jurisdiction and no mitigation is proposed (see Section 3.26 of this EIS).	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact**: The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-115 through 3-115	**Page 3-126 through 3-126**	**Page 3-144 through 3-145**	**Page 3-152 through 3-152**	**Page 3-178 through 3-179**
Impact:	**Impact 3.2.3.3-5:** Ground water flow modeling indicates that there could be a time-varying net change (decrease or increase) in the available ground water in Diamond Valley that is due solely to effects of the Proposed Action by the end of mining and milling operations and for at least 50 years post-Project; however, the magnitude of the predicted changes are less than 0.1 percent, compared to the overall ground water budget for Diamond Valley.	**Impact 3.2.3.4-5:** Ground water flow modeling indicates that there would be a further decrease in the available ground water stored in Diamond Valley due to continued agricultural pumping under the No Action Alternative, and that the declining trend in available ground water would persist until Year 2105 or longer depending upon future pumping rates.	**Impact 3.2.3.5-5:** Ground water flow modeling indicates that there could be a time-varying net change (decrease or increase) in the available ground water in Diamond Valley that is due solely to effects of the Partial Backfill Alternative by the end of mining and milling operations and for at least 50 years post-Project; however, the magnitude of the projected changes are less than 0.1 percent compared to the overall ground water budget for Diamond Valley.	**Impact 3.2.3.6-5:** Ground water flow modeling indicates that there could be a time-varying net change (decrease or increase) in the available ground water in Diamond Valley that is due solely to effects of the Off-Site Transfer of Ore Concentrate for Processing Alternative by the end of mining and milling operations and for at least 50 years post-Project; however, the magnitude of the predicted changes are less than 0.1 percent compared to the overall ground water budget for Diamond Valley.	**Impact 3.2.3.7-5:** Ground water flow modeling indicates that there could be a time-varying net change (decrease or increase) in the available ground water in Diamond Valley that is due solely to effects of the Slower, Longer Project Alternative by the end of mining and milling operations and for at least 50 years post-Project; however, the magnitude of the predicted changes are less than 0.2 percent, compared to the overall ground water budget for Diamond Valley.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** Impacts associated with the No Action Alternative are considered significant; however, these impacts are not under BLM jurisdiction and no mitigation is proposed (see Section 3.26 of this EIS)	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
Issue:	Consumptive Losses				
	Page 3-116 through 3-116	**Page 3-126 through 3-127**	**Page 3-145 through 3-145**	**Page 3-153 through 3-153**	**Page 3-179 through 3-179**
Impact:	**Impact 3.2.3.3-6:** Consumptive use of water during mining and milling operations would support a beneficial use and would not be expected to adversely impact water resources. Long-term consumptive use of ground water by evaporation from the pit lake surface is predicted to be approximately 100 gpm (161 afy) and would continue in perpetuity. This consumptive loss would only occur under the Proposed Action (and the Off-Site Transfer of Ore Concentrate for Processing Alternative and the Slower, Longer Project Alternative), and so represents a negative impact compared to the No Action Alternative.	**Impact 3.2.3.4-6:** Consumptive use of water for authorized agricultural irrigation, stock watering, mining and milling, or municipal uses constitute beneficial uses of water resources. However, the historical and existing (2009) rates of consumptive usage in Diamond Valley already appear to have impacted some water resources and may be unsustainable in the long term. Some of the pumping-related consumption of ground water in Diamond Valley is offset by the reduction in ground water loss due to less ET as the water table declines.	**Impact 3.2.3.5-6:** Consumptive use of water during mining and milling operations would support a beneficial use and would not be expected to adversely impact water resources. Long-term consumptive use of water by evaporation from the pit lake surface would not occur under the Partial Backfill Alternative, which is a positive impact compared to the Proposed Action and is a neutral impact compared to the No Action Alternative.	**Impact 3.2.3.6-6:** Consumptive use of water during mining and milling operations would support a beneficial use and would not be expected to adversely impact water resources, and EML would have adequate water rights to cover the consumptive use. Long-term consumptive use of ground water by evaporation from the pit lake surface is predicted to be approximately 100 gpm (161 afy) and would continue in perpetuity. This consumptive loss would only occur under the Off-Site Transfer of Ore Concentrate for Processing Alternative (and the Proposed Action and the Slower, Longer Project Alternative), and so represents a negative impact compared to the No Action Alternative. The 161 afy is less than 0.1 percent of the	**Impact 3.2.3.7-6:** Consumptive use of water during mining and milling operations would support a beneficial use and would not be expected to adversely impact water resources, and EML would have adequate water rights to cover the consumptive use. Long-term consumptive use of ground water by evaporation from the pit lake surface is predicted to be approximately 100 gpm (161 afy) and would continue in perpetuity. This consumptive loss would occur under the Slower, Longer Project Alternative (and the Proposed Action), and so represents a negative impact compared to the No Action Alternative. The 161 afy is less than 0.1 percent of the combined water budget for the Kobeh and Diamond Valleys.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
				combined water budget for the Kobeh and Diamond Valleys.	
Significance of the Impact:	**Significance of the Impact:** Impacts during mining and milling operations are less than significant. After those operations cease, direct impacts of pit lake evaporation do not result in significant impacts.	**Significance of the Impact:** Impacts associated with the No Action Alternative are not considered significant	**Significance of the Impact:** There is a positive impact compared to the Proposed Action and a neutral impact compared to the No Action Alternative. Impacts during mining and milling operations are less than significant. After those operations cease, direct impacts of pit lake evaporation would not occur and would, therefore, not result in significant impacts.	**Significance of the Impact:** Impacts during mining and milling operations are less than significant. After those operations cease, direct impacts of pit lake evaporation do not result in significant impacts.	**Significance of the Impact:** Impacts during mining and milling operations are less than significant. After those operations cease, direct impacts of pit lake evaporation do not result in significant impacts.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
Issue:	Potential Impacts Due to Subsidence				
	Page 3-117 through 3-117	**Page 3-127 through 3-127**	**Page 3-145 through 3-146**	**Page 3-153 through 3-153**	**Page 3-180 through 3-180**
Impact:	**Impact 3.2.3.3-7**: A small change in aquifer characteristics is expected to result from compaction of the aquifer materials. Ground subsidence of greater than one-half-foot is projected to extend approximately four miles quasi-radially from the center of subsidence effects in the northern part of the KVCWF area, and a maximum subsidence of approximately 2.5 feet is projected in a small part of that central area. The subsidence would result primarily from a permanent reduction in porosity of the finer grained sediments (clays and silty clays), which are not the primary water-bearing materials in the basin-fill aquifer.	**Impact 3.2.3.4-7:** A change in aquifer characteristics is expected to result from compaction of the aquifer materials. Ground subsidence of greater than one-half-foot is projected to extend approximately 13 miles to the north and south and five miles to the east and west from the center of maximum subsidence (approximately 13.5 feet) in southern Diamond Valley. The subsidence would result primarily from a permanent reduction in porosity of the finer grained sediments (clays and silty clays), but some reduction in the porosity of the primary water-bearing materials in the basin-fill aquifer may also occur.	**Impact 3.2.3.5-7:** A small change in aquifer characteristics is expected to result from compaction of the aquifer materials. Ground subsidence of greater than one-half-foot is projected to extend approximately four miles quasi-radially from the center of subsidence effects in the northern part of the KVCWF area, and a maximum subsidence of approximately 2.5 feet is projected in a small part of that central area. The subsidence would result primarily from a permanent reduction in porosity of the finer grained sediments (clays and silty clays), which are not the primary water-bearing materials in the basin-fill aquifer.	**Impact 3.2.3.6-7:** A small change in aquifer characteristics is expected to result from compaction of the aquifer materials. Ground subsidence of greater than one-half-foot is projected to extend approximately four miles quasi-radially from the center of subsidence effects in the northern part of the KVCWF area, and a maximum subsidence of approximately 2.5 feet is projected in a small part of that central area. The subsidence would result primarily from a permanent reduction in porosity of the finer grained sediments (clays and silty clays), which are not the primary water-bearing materials in the basin-fill aquifer.	**Impact 3.2.3.7-7:** A small change in aquifer characteristics is expected to result from compaction of the aquifer materials. Ground subsidence of greater than one-half-foot is projected to extend approximately four miles quasi-radially from the center of subsidence effects in the northern part of the KVCWF area, and a maximum subsidence of approximately 1.5 feet is projected in a small part of that central area. The subsidence would result primarily from a permanent reduction in porosity of the finer grained sediments (clays and silty clays), which are not the primary water-bearing materials in the basin-fill aquifer.
Significance of the Impact:	**Significance of the Impact:** The potential for the Kobeh Valley basin-fill aquifer to transmit or store water is not expected to be significantly impacted.	**Significance of the Impact:** Impacts associated with the No Action Alternative are considered significant; however, these impacts are not under BLM jurisdiction and no mitigation is proposed (see Section 3.26 of this EIS).	**Significance of the Impact:** The potential for the Kobeh Valley basin-fill aquifer to transmit or store water is not expected to be significantly impacted.	**Significance of the Impact:** The potential for the Kobeh Valley basin-fill aquifer to transmit or store water is not expected to be significantly impacted.	**Significance of the Impact:** The potential for the Kobeh Valley basin-fill aquifer to transmit or store water is not expected to be significantly impacted.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-118 through 3-118	**Page 3-128 through 3-128**	**Page 3-146 through 3-146**	**Page 3-154 through 3-154**	**Page 3-180 through 3-180**
Impact:	**Impact 3.2.3.3-8:** Differential subsidence could result in the development of fissures, creating a potential to degrade waters of the state. Fissures could provide a preferential flow path for uncontained process fluids or chemical or hydrocarbon releases. Capture of surface runoff by fissures may form erosional fissure gullies, which represent a safety risk to wildlife, livestock, wild horses, and people.	**Impact 3.2.3.4-8:** Differential subsidence could result in the development of fissures, creating a potential to degrade waters of the state. Fissures could provide a preferential flow path for contaminants released at the ground surface to reach the ground water system. Capture of surface runoff by fissures may form erosional fissure gullies, which represent a safety risk to wildlife, livestock, wild horses, and people.	**Impact 3.2.3.5-8:** Differential subsidence could result in the development of fissures, creating a potential to degrade waters of the state. Fissures could provide a preferential flow path for uncontained process fluids or chemical or hydrocarbon releases. Capture of surface runoff by fissures may form erosional fissure gullies, which represent a safety risk to wildlife, livestock, wild horses, and people.	**Impact 3.2.3.6-8:** Differential subsidence could result in the development of fissures, creating a potential to degrade waters of the state. Fissures could provide a preferential flow path for uncontained process fluids or chemical or hydrocarbon releases. Capture of surface runoff by fissures may form erosional fissure gullies, which represent a safety risk to wildlife, livestock, wild horses, and people.	**Impact 3.2.3.7-8:** Differential subsidence could result in the development of fissures, creating a potential to degrade waters of the state. Fissures could provide a preferential flow path for uncontained process fluids or chemical or hydrocarbon releases. Capture of surface runoff by fissures, may form erosional fissure gullies, which represent a safety risk to wildlife, livestock, wild horses, and people.
Significance of the Impact:	**Significance of the Impact**: The impact would be significant if fissure gullies formed.	**Significance of the Impact:** Impacts associated with the No Action Alternative are considered significant; however, these impacts are not under BLM jurisdiction and no mitigation is proposed (see Section 3.26 of this EIS).	**Significance of the Impact:** The impact would be significant if fissure gullies formed.	**Significance of the Impact:** The impact would be significant if fissure gullies formed.	**Significance of the Impact:** The impact would be significant if fissure gullies formed.
Mitigation Measure:	**Mitigation Measure 3.2.3.3-8:** EML would be responsible for specifically monitoring for fissure gully development. If fissure gullies form, they would be filled in with clean, coarse-grained alluvium, with the intent of providing a rapid means of dissipation for any surface water entering the fissure and thereby reducing the propagation of the fissure through continued erosion. The fill material then would be seeded with a BLM-approved seed mix.	N/A	**Mitigation Measure 3.2.3.5-8:** As part of the comprehensive water resources monitoring program (Mitigation Measure 3.2.3.5-2a), EML would be responsible for specifically monitoring for fissure gully development. If fissure gullies form, they would be filled in with clean, coarse-grained alluvium, with the intent of providing a rapid means of dissipation for any surface water entering the fissure and thereby reducing the propagation of the fissure through continued erosion. The fill material then would be seeded with a BLM-approved seed mix.	**Mitigation Measure 3.2.3.6-8:** EML would be responsible for specifically monitoring for fissure gully development. If fissure gullies form, they would be filled in with clean, coarse-grained alluvium, with the intent of providing a rapid means of dissipation for any surface water entering the fissure, thereby reducing the propagation of the fissure through continued erosion. The fill material then would be seeded with a BLM-approved seed mix.	**Mitigation Measure 3.2.3.7-8:** EML would be responsible for specifically monitoring for fissure gully development. If fissure gullies form, they would be filled in with clean, coarse-grained alluvium, with the intent of providing a rapid means of dissipation for any surface water entering the fissure, thereby reducing the propagation of the fissure through continued erosion. The fill material then would be seeded with a BLM-approved seed mix.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.2.3.3-8 would be effective at mitigating the fissures that develop because they would be filled immediately. Any residual effects of fissure development would be fully mitigated during the life of the Project.	N/A	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.2.3.5-8 would be effective at mitigating the fissures that develop. Any residual effects of fissure development would be fully mitigated during the life of the Project.	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.2.3.6-8 would be effective at mitigating the fissures that develop. Any residual effects of fissure development would be fully mitigated during the life of the Project.	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.2.3.7-8 would be effective at mitigating the fissures that develop. Any residual effects of fissure development would be fully mitigated during the life of the Project.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
WATER RESOURCES - WATER QUALIITY					
	Page 3-218 through 3-218		**Page 3-233 through 3-233**	**Page 3-236 through 3-236**	**Page 3-237 through 3-238**
Impact:	**Impact 3.3.3.3-1:** There would be a moderate to high potential for impacts to surface water quality due to erosion and possible breaching of the North TSF under the Proposed Action.	N/A	**Impact 3.3.3.5-1:** There would be a moderate to high potential for impacts to surface water quality due to erosion and possible breaching of the North TSF under the Partial Backfill Alternative.	**Impact 3.3.3.6-1:** There would be a moderate to high potential for impacts to surface water quality due to erosion and possible breaching of the North TSF under the Off-Site Transfer of Ore Concentrate for Processing Alternative.	**Impact 3.3.3.7-1:** There would be a moderate to high potential for impacts to surface water quality due to erosion and possible breaching of the North TSF under the Slower, Longer Project Alternative.
Significance of the Impact:	**Significance of the Impact:** The impact is considered potentially significant.	N/A	**Significance of the Impact:** The impact is considered potentially significant.	**Significance of the Impact:** The impact is considered potentially significant.	**Significance of the Impact:** The impact is considered potentially significant.
Mitigation Measure:	**Mitigation Measure 3.3.3.3-1:** EML would submit a North TSF upstream diversion structure design. This design would be of sufficient capacity to divert run-on from the North TSF so that the current evaporate pond design would be sufficient to contain the designed storm events. The design would be submitted to the BLM 24 months prior to the anticipated start of construction. The BLM would approve the design prior to the commencement of construction.	N/A	**Mitigation Measure 3.3.3.5-1:** EML would submit a North TSF upstream diversion structure design. This design would be of sufficient capacity to divert run-on from the North TSF so that the current evaporate pond design would sufficient to contain the designed storm events. The design would be submitted to the BLM 24 months prior to the anticipated start of construction. The BLM would approve the design prior to the commencement of construction.	**Mitigation Measure 3.3.3.6-1:** EML would submit a North TSF upstream diversion structure design. This design would be of sufficient capacity to divert run-on from the North TSF so that the current evaporate pond design would be sufficient to contain the designed storm events. The design would be submitted to the BLM 24 months prior to the anticipated start of construction. The BLM would approve the design prior to the commencement of construction.	**Mitigation Measure 3.3.3.7-1:** EML would submit a North TSF upstream diversion structure design. This design would be of sufficient capacity to divert run-on from the North TSF so that the current evaporate pond design would be sufficient to contain the designed storm events. The design would be submitted to the BLM 24 months prior to the anticipated start of construction. The BLM would approve the design prior to the commencement of construction.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.3-1 would be effective at preventing erosion and possible breaching of the North TSF. The design would be based on an engineering evaluation of the topography and design precipitation event (24 hour-100 year event) as required by the NDEP so that the design event would effectively be conveyed away from the North TSF.	N/A	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.5-1 would be effective preventing erosion and possible breaching of the North TSF. The design would be based on an engineering evaluation of the topography and design precipitation event (24 hour-100 year event) as required by the NDEP so that the design event would effectively be conveyed away from the North TSF.	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.6-1 would be effective at preventing erosion and possible breaching of the North TSF. The design would be based on an engineering evaluation of the topography and design precipitation event (24 hour-100 year event) as required by the NDEP so that the design event would effectively be conveyed away from the North TSF. With the implementation of the mitigation measure, the residual impact of the Off-Site Transfer of Ore Concentrate for Processing Alternative would be limited to natural erosion processes.	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.7-1 would be effective at preventing erosion and possible breaching of the North TSF. The design would be based on an engineering evaluation of the topography and design precipitation event (24 hour-100 year event) as required by the NDEP so that the design event would effectively be conveyed away from the North TSF. With the implementation of the mitigation measure, the residual impact of the Slower, Longer Project Alternative would be limited to natural erosion processes.
	Page 3-218 through 3-218		**Page 3-233 through 3-234**	**Page 3-236 through 3-236**	**Page 3-238 through 3-238**
Impact:	**Impact 3.3.3.3-2:** The ground water drawdown is predicted to be greater than ten feet for the perennial stream segments of Roberts Creek for varying periods of time up to at least 400 years after the end of mining and milling operations.	N/A	**Impact 3.3.3.5-2:** The ground water drawdown is predicted to be more than ten feet for the perennial stream segments of Roberts Creek for varying periods of time up to at least 400 years after the end of mining and milling operations.	**Impact 3.3.3.6-2:** The ground water drawdown is predicted to be more than ten feet for the perennial stream segments of Roberts Creek for varying periods of time up to at least 400 years after the end of mining and milling operations.	**Impact 3.3.3.7-2:** The ground water drawdown is predicted to be more than ten feet for the perennial stream segments of Roberts Creek for varying periods of time up to at least 400 years after the end of mining and milling operations.
Significance of the Impact:	**Significance of the Impact:** The impact is considered potentially significant.	N/A	**Significance of the Impact:** The impact is considered potentially significant.	**Significance of the Impact:** The impact is considered potentially significant.	**Significance of the Impact:** The impact is considered potentially significant.
Mitigation Measure:	**Mitigation Measure 3.3.3.3-2:** The measures outlined under Mitigation Measure 3.2.3.3-2 would address the potential reduced flows outlined in the impact.	N/A	**Mitigation Measure 3.3.3.5-2:** The measures outlined under Mitigation Measure 3.2.3.5-2 would address the potential reduced flows outlined in the impact.	**Mitigation Measure 3.3.3.6-2:** The measures outlined under Mitigation Measure 3.2.3.3-2 would address the potential reduced flows outlined in the impact.	**Mitigation Measure 3.3.3.7-2:** The measures outlined under Mitigation Measure 3.2.3.7-2 would address the potential reduced flows outlined in the impact.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.3-2 would be effective at preventing degradation of water quality in Roberts Creek. The mitigation measure would restore flows to the creek, which would remove the underlying cause of this potential impact.	N/A	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.5-2 would be effective at preventing degradation of water quality in Roberts Creek. The mitigation measure would restore flows to the creek, which would remove the underlying cause of this potential impact.	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.6-2 would be effective at preventing degradation of water quality in Roberts Creek. The mitigation measure would restore flows to the creek, which would remove the underlying cause of this potential impact.	**Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.7-2 would be effective at preventing degradation of water quality in Roberts Creek. The mitigation measure would restore flows to the creek, which would remove the underlying cause of this potential impact.
	Page 3-219 through 3-220		**Page 3-234 through 3-234**	**Page 3-237 through 3-237**	**Page 3-238 through 3-238**
Impact:	**Impact 3.3.3.3-3:** There would be a low potential for impacts to ground water quality due to drainage from tailings impoundments and waste rock piles under the Proposed Action.	N/A	**Impact 3.3.3.5-3:** There would be a low potential for impacts to ground water quality due to drainage from tailings impoundments and waste rock piles under the Partial Backfill Alternative.	**Impact 3.3.3.6-3:** There would be a low potential for impacts to ground water quality due to drainage from tailings impoundments and waste rock piles under the Off-Site Transfer of Ore Concentrate for Processing Alternative.	**Impact 3.3.3.7-3:**There would be a low potential for impacts to ground water quality due to drainage from tailings impoundments and WRDFs under the Slower, Longer Project Alternative.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	N/A	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-220 through 3-220		**Page 3-235 through 3-236**	**Page 3-237 through 3-237**	**Page 3-238 through 3-238**
Impact:	**Impact 3.3.3.3-4:** There would be a low potential for impacts to ground water quality due to the formation of a ground water sink in	N/A	**Impact 3.3.3.5-4:** It is expected that the ground water flowing from backfill material would exceed Nevada DWS under the	**Impact 3.3.3.6-4:** There would be a low potential for impacts to ground water quality due to the formation of a ground water	**Impact 3.3.3.7-4:** There would be a low potential for impacts to ground water quality due to the formation of a ground water

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	the open pit under the Proposed Action.		Partial Backfill Alternative.	sink in the open pit under the Off-Site Transfer of Ore Concentrate for Processing Alternative.	sink in the open pit under the Slower, Longer Project Alternative.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	N/A	**Significance of the Impact:** The impacts to ground water quality under the Partial Backfill Alternative would be significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	**Mitigation Measure 3.3.3.5-4:** Mitigation for this impact would require the removal of sufficient backfill material for the formation of an evaporative ground water sink. Implementation of this mitigation would be otherwise inconsistent with the reasoning for selecting this alternative.	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
GEOLOGY AND MINERAL RESOURCES					
	Page 3-260 through 3-260	**Page 3-261 through 3-261**	**Page 3-262 through 3-263**	**Page 3-263 through 3-263**	**Page 3-264 through 3-264**
Impact:	**Impact 3.4.3.3-1:** Implementation of the Proposed Action would result in resource extraction and production of 1.1 billion pounds of Mo.	**Impact 3.4.3.4-1:** A known mineral resource with 1.1 billion pounds of recoverable Mo would not be developed due to implementation of the No Action Alternative.	**Impact 3.4.3.5-1:** Implementation of the Partial Backfill Alternative would result in resource extraction and production of 1.1 billion pounds of Mo.	**Impact 3.4.3.6-1:** Implementation of the Proposed Action would result in resource extraction and production of 1.1 billion pounds of Mo.	**Impact 3.4.3.7-1:** Implementation of the Slower, Longer Project Alternative would result in resource extraction and production of 1.1 billion pounds of Mo.
Significance of the Impact:	**Significance of the Impact:** This is not considered a potentially significant impact to geology and minerals. However, the impact is economically significant.	**Significance of the Impact:** This impact is considered significant; however, no mitigation measures appear feasible.	**Significance of the Impact:** This is not considered a potentially significant impact to geology and minerals. However, the impact is economically significant.	**Significance of the Impact:** This is not considered a potentially significant impact to geology and minerals. However, the impact is economically significant.	**Significance of the Impact:** This is not considered a potentially significant impact to geology and minerals. However, the impact is economically significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-260 through 3-260		**Page 3-262 through 3-262**	**Page 3-263 through 3-263**	**Page 3-264 through 3-264**
Impact:	**Impact 3.4.3.3-2:** Implementation of the Proposed Action would result in the extraction of waste rock that would be placed adjacent to the open pit and limit the future development of the identified Zn mineralization located to the north of the open pit.	N/A	**Impact 3.4.3.5-2:** Implementation of the Partial Backfill Alternative would result in the extraction of waste rock that would be placed adjacent to the open pit and then replaced within the open pit, thus limiting the future development of the identified Zn mineralization located to the north of the open pit to a degree that is greater than under the Proposed Action.	**Impact 3.4.3.6-2:** Implementation of the Proposed Action would result in the extraction of waste rock that would be placed adjacent to the open pit and limit the future development of the identified Zn mineralization located to the north of the open pit.	**Impact 3.4.3.7-2:** Implementation of the Slower, Longer Project Alternative would result in the extraction of waste rock that would be placed adjacent to the open pit and limit the future development of the identified Zn mineralization located to the north of the open pit.
Significance of the Impact:	**Significance of the Impact:** This is not considered a potentially significant impact to geology and minerals, because a known Zn mineralization has not been sufficiently defined and potentially could be developed using underground mining techniques.	N/A	**Significance of the Impact:** This is not considered a potentially significant impact to geology and minerals, because a known Zn mineralization has not been sufficiently defined and potentially could be developed using underground mining techniques.	**Significance of the Impact:** This is not considered a potentially significant impact to geology and minerals, because a known Zn mineralization has not been sufficiently defined and potentially could be developed using underground mining techniques.	**Significance of the Impact:** This is not considered a potentially significant impact to geology and minerals, because a known Zn mineralization has not been sufficiently defined and potentially could be developed using underground mining techniques.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
PALEONTOLOGY					
Issue:	No Issues or Impacts to Paleontology Have Been Identified				
AIR AND ATMOSPHERIC VALUES					
	Page 3-293 through 3-293	**Page 3-304 through 3-305**	**Page 3-307 through 3-307**	**Page 3-310 through 3-310**	**Page 3-313 through 3-313**
Impact:	**Impact 3.6.3.3-1:** Emissions of PM_{10}, $PM_{2.5}$, and Pb would be generated by numerous processes as a result of the Proposed Action, including the resuspension of road dust, wind erosion of exposed dirt surfaces, and activities related to the processing of ore materials. These activities are inherent to the mining process and would be ongoing throughout the life of the Proposed Action. The modeled PM_{10}, $PM_{2.5}$, and Pb concentrations show levels below the NSAAQS and NAAQS, even with the addition of the background values.	**Impact 3.6.3.4-1:** Emissions of PM_{10}, $PM_{2.5}$, and Pb would be generated by the No Action Alternative in an amount substantially less than under the Proposed Action. The modeled PM_{10}, $PM_{2.5}$, and Pb concentrations under the Proposed Action support the conclusion that these concentrations under the No Action Alternative would be below the NSAAQS and NAAQS, even with the addition of the background values.	**Impact 3.6.3.5-1:** The emissions of PM_{10}, $PM_{2.5}$, and Pb would be generated by numerous processes as a result of the Partial Backfill Alternative, including the resuspension of road dust, wind erosion of exposed dirt surfaces, and activities related to the processing of ore materials. These activities are inherent to the mining process and would be ongoing throughout the life of the Partial Backfill Alternative. Since this alternative is essentially the same as the Proposed Action, just longer in duration, the PM_{10}, $PM_{2.5}$, and Pb concentrations would be below the NSAAQS and NAAQS, even with the addition of the background values.	**Impact 3.6.3.6-1:** Emissions of PM_{10}, $PM_{2.5}$, and Pb would be generated by numerous processes as a result of the Off-Site Transfer of Ore Concentrate for Processing Alternative, including the resuspension of road dust, wind erosion of exposed dirt surfaces, and activities related to the processing of ore materials. These activities are inherent to the mining process and would be ongoing throughout the life of the Project. The PM_{10}, $PM_{2.5}$, and Pb concentrations would be below the NSAAQS and NAAQS, even with the addition of the background values.	**Impact 3.6.3.7-1:** The emissions of PM_{10}, $PM_{2.5}$, and Pb would be generated by essentially identical processes as discussed under the Proposed Action. However, the concentrations of these pollutants would be lower than modeled for the Proposed Action due to the halved production rate and decreased operating thresholds of smaller equipment and facilities. The resulting concentrations of PM_{10}, $PM_{2.5}$, and Pb would be lower than the Proposed Action which are below the NSAAQS and NAAQS.
Significance of the Impact:	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-294 through 3-294	**Page 3-305 through 3-305**	**Page 3-308 through 3-308**	**Page 3-311 through 3-311**	**Page 3-314 through 3-314**
Impact:	**Impact 3.6.3.3-2:** Combustion emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and VOC would be generated by numerous processes as a result of the Proposed Action, including combustion emissions from diesel engines and burning propane, fuel oil, or diesel in various process equipments. The modeled CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and VOC show levels below the NSAAQS and NAAQS.	**Impact 3.6.3.4-2:** Combustion emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and VOC would be generated by the No Action Alternative in amounts that would be substantially less than under the Proposed Action. The modeled CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 concentrations under the Proposed Action support the conclusion that these concentrations under the No Action Alternative would be below the NSAAQS and NAAQS, even with the addition of the background values.	**Impact 3.6.3.5-2:** Combustion emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and VOC would be generated by numerous processes as a result of the Partial Backfill Alternative, including combustion emissions from diesel engines and burning propane, fuel oil, or diesel in various process equipment. These emissions would be essentially the same as under the Proposed Action, except longer in duration. Therefore, the CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 concentrations would be below the NSAAQS and NAAQS.	**Impact 3.6.3.6-2:** Combustion emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and VOC would be generated by numerous processes as a result of the Off-Site Transfer of Ore Concentrate for Processing Alternative, including combustion emissions from diesel engines, and burning propane, fuel oil, or diesel in various process equipments. The CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 concentrations would be below the NSAAQS and NAAQS.	**Impact 3.6.3.7-2:** Combustion emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and VOC (and resultant O_3 concentrations) would be generated by numerous processes as a result of the Slower, Longer Project Alternative, including combustion emissions from diesel engines and burning propane, fuel oil, or diesel in various process equipment. These emissions would be lower than the Proposed Action when examined on a daily, monthly or annual basis (according to the exposure time period the air quality standards are associated with). Therefore, the CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 concentrations would be below the NSAAQS and NAAQS.
Significance of the Impact:	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-303 through 3-303	**Page 3-306 through 3-306**	**Page 3-309 through 3-309**	**Page 3-311 through 3-312**	**Page 3-314 through 3-314**
Impact:	**Impact 3.6.3.3-3:** The modeled PM_{10}, $PM_{2.5}$, Pb, CO, NO_2, SO_2, and O_3 from the Proposed Action emissions show a very small increase in these pollutants at the sensitive receptors.	**Impact 3.6.3.4-3:** The emissions of PM_{10}, $PM_{2.5}$, Pb, CO, NO_2, SO_2, and O_3 from the No Action Alternative emissions may show a very small increase in these pollutants at the sensitive receptors and any potential impacts would be less than those under the Proposed Action.	**Impact 3.6.3.5-3:** The PM_{10}, $PM_{2.5}$, Pb, CO, NO_2, SO_2, and O_3 concentrations from the Partial Backfill Alternative would show a very small increase in these pollutants at the sensitive receptors.	**Impact 3.6.3.6-3:** The PM_{10}, $PM_{2.5}$, Pb, CO, NO_2, SO_2, and VOC concentrations from the Off-Site Transfer of Ore Concentrate for Processing Alternative would show a very small increase in these pollutants at the sensitive receptors.	**Impact 3.6.3.7-3:** The PM_{10}, $PM_{2.5}$, Pb, CO, NO_2, SO_2, and O_3 concentrations from the Slower, Longer Project Alternative would show a decrease in these pollutants at the sensitive receptors.
Significance of the Impact:	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
			VISUAL RESOURCES		
	Page 3-328 through 3-341		**Page 3-343 through 3-343**	**Page 3-345 through 3-345**	**Page 3-347 through 3-348**
Impact:	**Impact 3.7.3.3-1:** The proposed mining activities would be visible from all five KOPs. The visual impacts would be consistent with VRM Class IV management at KOPs #1, #3, #4, and #5. From KOP #2, which is the only KOP where the Class III management area is visible, the view is not consistent with that management class.	N/A	**Impact 3.7.3.5-1:** The proposed mining activities would be visible from all five KOPs. The visual impacts would be consistent with VRM Class IV management at KOPs #1, #3, #4, and #5. From KOP #2, which is the only KOP where the Class III management area is visible, the view is not consistent with that management class.	**Impact 3.7.3.6-1:** The proposed mining activities would be visible from all five KOPs. The visual impacts would be consistent with VRM Class IV management at KOPs #1, #3, #4, and #5. From KOP #2, which is the only KOP where the Class III management area is visible, the view is not consistent with that management class.	**Impact 3.7.3.7-1:** The proposed mining activities would be visible from all five KOPs. The visual impacts would be consistent with VRM Class IV management at KOPs #1, #3, #4, and #5. From KOP #2, which is the only KOP where the Class III management area is visible, the view is not consistent with that management class.
Significance of the Impact:	**Significance of the Impact:** This impact is considered significant because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.	N/A	**Significance of the Impact:** This impact is considered significant, because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.	**Significance of the Impact:** This impact is considered significant, because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.	**Significance of the Impact:** This impact is considered significant, because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.
Mitigation Measure:	**Mitigation Measure 3.7.3.3-1:** For reducing visual contrast, minimization of disturbance would be the most effective mitigation technique. Where disturbance is proposed, repetition of the basic landscape elements (form, line, color, and texture) would be implemented to minimize visual change. In order to lessen long-term visual impacts from the pit wall, treatment may be required to ensure that the final pit wall mimics the surrounding landscape colors as visible from KOP #2. Methods could include, but are not limited to, painting, staining, varnishing, or some other treatment that minimizes the contrast of the visibly exposed and unweathered rock of the pit wall. Any mitigation applications must be pH neutral and contain no caustic or alkaline chemicals to avoid potential adverse environmental impacts. Treatment may occur when the pit wall reaches its final slope configuration. The need for this treatment would be determined by the BLM at that time based on the color of the exposed pit wall surface and its contrast with the surrounding landscape. Specific dimensions and areas of mitigation would be determined by the BLM, based on the actual color of the final pit wall.	N/A	**Mitigation Measure 3.7.3.5-1:** For reducing visual contrast, minimization of disturbance would be the most effective mitigation technique. Where disturbance is proposed, repetition of the basic landscape elements (form, line, color, and texture) would be implemented to minimize visual change. In order to lessen long-term visual impacts from the pit wall, treatment may be required to ensure that the final pit wall mimics the surrounding landscape colors as visible from KOP #2. Methods could include, but are not limited to, painting, staining, varnishing, or some other treatment that minimizes the contrast of the visibly exposed and unweathered rock of the pit wall. Any mitigation applications must be pH neutral and contain no caustic or alkaline chemicals to avoid potential adverse environmental impacts. Treatment may occur when the pit wall reaches its final slope configuration. The need for this treatment would be determined by the BLM at that time based on the color of the exposed pit wall surface and its contrast with the surrounding landscape. Specific dimensions and areas of mitigation would be determined by the BLM, based on the actual color of the final pit wall.	**Mitigation Measure 3.7.3.6-1:** For reducing visual contrast, minimization of disturbance would be the most effective mitigation technique. Where disturbance is proposed, repetition of the basic landscape elements (form, line, color, and texture) would be implemented to minimize visual change. In order to lessen long-term visual impacts from the pit wall, treatment may be required to ensure that the final pit wall mimics the surrounding landscape colors as visible from KOP #2. Methods could include, but are not limited to, painting, staining, varnishing, or some other treatment that minimizes the contrast of the visibly exposed and unweathered rock of the pit wall. Any mitigation applications must be pH neutral and contain no caustic or alkaline chemicals to avoid potential adverse environmental impacts. Treatment may occur when the pit wall reaches its final slope configuration. The need for this treatment would be determined by the BLM at that time based on the color of the exposed pit wall surface and its contrast with the surrounding landscape. Specific dimensions and areas of mitigation would be determined by the BLM, based on the actual color of the final pit wall.	**Mitigation Measure 3.7.3.7-1:** For reducing visual contrast, minimization of disturbance would be the most effective mitigation technique. Where disturbance is proposed, repetition of the basic landscape elements (form, line, color, and texture) would be implemented to minimize visual change. In order to lessen long-term visual impacts from the pit wall, treatment may be required to ensure that the final pit wall mimics the surrounding landscape colors as visible from KOP #2. Methods could include, but are not limited to, painting, staining, varnishing, or some other treatment that minimizes the contrast of the visibly exposed and unweathered rock of the pit wall. Any mitigation applications must be pH neutral and contain no caustic or alkaline chemicals to avoid potential adverse environmental impacts. Treatment may occur when the pit wall reaches its final slope configuration. The need for this treatment would be determined by the BLM at that time based on the color of the exposed pit wall surface and its contrast with the surrounding landscape. Specific dimensions and areas of mitigation would be determined by the BLM, based on the actual color of the final pit wall.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	Clearing of land for WRDFs and facility construction would be done by creating curvilinear boundaries instead of straight lines to minimize disturbance of the landscape. Grading would proceed in a manner that would minimize erosion and conform to the natural topography. Revegetation following recontouring would also reduce visual impacts. The specifics on the final reclamation design implementation would be completed in consultation with interested parties.		Clearing of land for WRDFs and facility construction would be done by creating curvilinear boundaries instead of straight lines to minimize disturbance of the landscape. Grading would proceed in a manner that would minimize erosion and conform to the natural topography. Revegetation following recontouring would also reduce visual impacts. The specifics on the final reclamation design implementation would be completed in consultation with interested parties.	Clearing of land for WRDFs and facility construction would be done by creating curvilinear boundaries instead of straight lines to minimize disturbance of the landscape. Grading would proceed in a manner that would minimize erosion and conform to the natural topography. Revegetation following recontouring would also reduce visual impacts. The specifics on the final reclamation design implementation would be completed in consultation with interested parties.	Clearing of land for WRDFs and facility construction would be done by creating curvilinear boundaries instead of straight lines to minimize disturbance of the landscape. Grading would proceed in a manner that would minimize erosion and conform to the natural topography. Revegetation following recontouring would also reduce visual impacts. The specifics on the final reclamation design implementation would be completed in consultation with interested parties.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** The effectiveness of this mitigation in reducing the impact to less than significant is not likely; however, given the type and scale of the action this mitigation would be the most effective approach at limiting the impact. The Proposed Action would result in unavoidable physical change in the existing contour and character of the Project Area. The changes would be visibly most apparent over the active life of the Project, but would diminish through the completion of reclamation and revegetation activities contained as part of the Proposed Action. The physical changes to the area would be permanent, but would lessen following the completion of final reclamation as natural processes continue to soften the line and form to match the surrounding landscape.	N/A	**Effectiveness of Mitigation and Residual Effects:** The effectiveness of this mitigation in reducing the impact to less than significant is not likely; however, given the type and scale of the action this mitigation would be the most effective at limiting the impact.	**Effectiveness of Mitigation and Residual Effects:** The effectiveness of this mitigation in reducing the impact to less than significant is not likely; however, given the type and scale of the action this mitigation would be the most effective at limiting the impact.	**Effectiveness of Mitigation and Residual Effects:** The effectiveness of this mitigation in reducing the impact to less than significant is not likely; however, given the type and scale of the action this mitigation would be the most effective at limiting the impact. The Slower, Longer Project Alternative would result in unavoidable physical change in the existing contour and character of the Project Area. The changes would be visibly most apparent over the active life of the Project, but would diminish through the completion of reclamation and revegetation activities contained as part of the Slower, Longer Project Alternative. The physical changes to the area would be permanent, but would lessen following the completion of final reclamation as natural processes continue to soften the line and form to match the surrounding landscape.
	Page 3-341 through 3-341		**Page 3-343 through 3-344**	**Page 3-346 through 3-346**	**Page 3-348 through 3-348**
Impact:	**Impact 3.7.3.3-2:** The proposed buildings associated with mining activities would be visible from KOP #2 during mining and processing operations, which is not consistent with VRM Class III management.	N/A	**Impact 3.7.3.5-2**: The proposed buildings associated with the Partial Backfill Alternative would be visible from KOP #2 during mining and processing operations, which is not consistent with VRM Class III management.	**Impact 3.7.3.6-2:** The proposed buildings associated with the Off-Site Transfer of Ore Concentrate for Processing Alternative would be visible from KOP #2 during mining and processing, which is not consistent with VRM Class III management.	**Impact 3.7.3.7-2:** The proposed buildings associated with the Slower, Longer Project Alternative would be visible from KOP #2, which is not consistent with VRM Class III management.
Significance of the Impact:	**Significance of the Impact:** This impact is considered significant because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.	N/A	**Significance of the Impact:** This impact is considered significant because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.	**Significance of the Impact:** This impact is considered significant because of the views from KOP #2. The following mitigation measure would reduce the adverse effects of the impact.	**Significance of the Impact:** This impact is considered significant because of the views from KOP #2 during mining and process operations. The following mitigation measure would reduce the adverse effects of the impact.
Mitigation Measure:	**Mitigation Measure 3.7.3.3-2:** Visual contrast, associated with the buildings, would be reduced by using construction materials or paints that are earth tones. This would minimize color contrasts with the surrounding landscape and help meet VRM objectives.	N/A	**Mitigation Measure 3.7.3.5-2:** Visual contrast, associated with the buildings, would be reduced by using construction materials or paints that are earth tones. This would minimize color contrasts with the surrounding landscape.	**Mitigation Measure 3.7.3.6-2:** Visual contrast, associated with the buildings, would be reduced by using construction materials or paints that are earth tones. This would minimize color contrasts with the surrounding landscape.	**Mitigation Measure 3.7.3.7-2:** Visual contrast, associated with the buildings, would be reduced by using construction materials or paints that are earth tones. This would minimize color contrasts with the surrounding landscape.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would minimize color contrasts within the viewshed and effectively mitigate visual impacts from the buildings. There would be no residual effects from this impact.	N/A	**Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would minimize color contrasts within the viewshed and effectively mitigate visual impacts from the buildings. There would be no residual effects from this impact.	**Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would minimize color contrasts within the viewshed and effectively mitigate visual impacts from the buildings. There would be no residual effects from this impact.	**Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would minimize color contrasts within the viewshed and effectively mitigate visual impacts from the buildings. There would be no residual effects from this impact.
	Page 3-341 through 3-342		**Page 3-344 through 3-344**	**Page 3-346 through 3-346**	**Page 3-348 through 3-348**
Impact:	**Impact 3.7.3.3-3:** The proposed mining activities would increase light pollution in the region.	N/A	**Impact 3.7.3.5-3:** The proposed mining activities associated with the Partial Backfill Alternative would increase light pollution in the region.	**Impact 3.7.3.6-3:** The proposed mining activities associated with the Off-Site Transfer of Ore Concentrate for Processing Alternative would increase light pollution in the region.	**Impact 3.7.3.7-3:** The proposed mining activities associated with the Off-Site Transfer of Ore Concentrate for Processing Alternative would increase light pollution in the region.
Significance of the Impact:	**Significance of the Impact:** This impact is not considered significant; however, the following mitigation measure would reduce the adverse effects of the impact.	N/A	**Significance of the Impact:** This impact is not considered significant; however, the following mitigation measure would reduce the adverse effects of the impact.	**Significance of the Impact:** This impact is not considered significant; however, the following mitigation measure would reduce the adverse effects of the impact.	**Significance of the Impact:** This impact is not considered significant; however, the following mitigation measure would reduce the adverse effects of the impact.
Mitigation Measure:	**Mitigation Measure 3.7.3.3-3:** To maintain dark sky conditions, and minimize visual disturbance, facility perimeter lighting, including lighting used to illuminate walkways, roadways, staging areas and parking areas, would be shielded so that the light would be cast in a downward direction. Low-pressure sodium lighting (or an improved technology, if readily available) would be used to reduce or eliminate detrimental lighting impacts and prevent unnecessary light pollution.	N/A	**Mitigation Measure 3.7.3.5-3:** To maintain dark sky conditions, and minimize visual disturbance, facility perimeter lighting, including lighting used to illuminate walkways, roadways, staging areas and parking areas, would be shielded so that the light would be cast in a downward direction. Low-pressure sodium lighting (or an improved technology, if readily available) would be used to reduce or eliminate detrimental lighting impacts and prevent unnecessary light pollution.	**Mitigation Measure 3.7.3.6-3:** To maintain dark sky conditions, and minimize visual disturbance, facility perimeter lighting, including lighting used to illuminate walkways, roadways, staging areas and parking areas, would be shielded so that the light would be cast in a downward direction. Low-pressure sodium lighting (or an improved technology, if readily available) would be used to reduce or eliminate detrimental lighting impacts and prevent unnecessary light pollution.	**Mitigation Measure 3.7.3.7-3:** To maintain dark sky conditions, and minimize visual disturbance, facility perimeter lighting, including lighting used to illuminate walkways, roadways, staging areas and parking areas, would be shielded so that the light would be cast in a downward direction. Low-pressure sodium lighting (or an improved technology, if readily available) would be used to reduce or eliminate detrimental lighting impacts and prevent unnecessary light pollution.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would reduce the effects on the surrounding area and effectively mitigate impacts associated with light pollution in keeping with the objectives of dark sky goals.	N/A	**Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would reduce the effects on the surrounding area and effectively mitigate impacts associated with light pollution in keeping with the objectives of dark sky goals.	**Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would reduce the effects on the surrounding area and effectively mitigate impacts associated with light pollution in keeping with the objectives of dark sky goals.	**Effectiveness of Mitigation and Residual Effects:** Implementation of this measure would reduce the effects on the surrounding area and effectively mitigate impacts associated with light pollution in keeping with the objectives of dark sky goals.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
SOIL RESOURCES					
	Page 3-365 through 3-365	**Page 3-367 through 3-367**	**Page 3-368 through 3-368**	**Page 3-370 through 3-370**	**Page 3-371 through 3-371**
Impact:	**Impact 3.8.3.3-1:** Based on the 8,355 acres of direct disturbance of soils and the potential indirect effect to soils in Kobeh Valley as a result of potential fissure development and loss of vegetation, accelerated soil erosion rates may occur under the Proposed Action due to continued surface soil disturbance, the removal of vegetation cover, alterations in soil compaction and slope gradients, and soil salvaging and stockpiling activities.	**Impact 3.8.3.4-1:** Based on the 35 acres of direct effects to soils, accelerated soil erosion rates may occur under the No Action Alternative due to continued surface soil disturbance, the removal of vegetation cover, alterations in soil compaction and slope gradients, and soil salvaging and stockpiling activities.	**Impact 3.8.3.5-1:** Based on the 8,355 acres of direct disturbance of soils and the potential indirect effect to soils in Kobeh Valley as a result of potential fissure development and loss of vegetation, accelerated soil erosion rates may occur under the Partial Backfill Alternative due to continued surface soil disturbance, the removal of vegetation cover, alterations in soil compaction and slope gradients, and soil salvaging and stockpiling activities.	**Impact 3.8.3.6-1:** Based on the 8,315 acres of direct disturbance of soils and the potential indirect effect to soils in Kobeh Valley as a result of potential fissure development and loss of vegetation, accelerated soil erosion rates may occur under the Off-Site Transfer of Ore Concentrate for Processing Alternative due to continued surface soil disturbance, the removal of vegetation cover, alterations in soil compaction and slope gradients, and soil salvaging and stockpiling activities.	**Impact 3.8.3.7-1:** Based on the 8,355 acres of direct disturbance of soils and the potential indirect effect to soils in Kobeh Valley as a result of potential fissure development and loss of vegetation, accelerated soil erosion rates may occur under the Slower, Longer Project Alternative due to continued surface soil disturbance, the removal of vegetation cover, alterations in soil compaction and slope gradients, and soil salvaging and stockpiling activities.
Significance of the Impact:	**Significance of the Impact:** Based upon the implementation of applicant committed practices, BMPs, and reclamation activities, this impact is not considered significant.	**Significance of the Impact:** Based upon the implementation of applicant committed practices, BMPs, reclamation activities, and the insignificant amount of surface disturbance that would be caused by the No Action Alternative, this impact is considered less than significant, and no further mitigation measures are proposed.	**Significance of the Impact:** Based upon the implementation of applicant committed practices, BMPs, and reclamation activities, this impact is not considered significant.	**Significance of the Impact:** Based upon the implementation of applicant committed practices, BMPs, and reclamation activities, this impact is not considered significant.	**Significance of the Impact:** Based upon the implementation of applicant committed practices, BMPs, and reclamation activities, this impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-366 through 3-366	**Page 3-367 through 3-367**	**Page 3-369 through 3-369**	**Page 3-370 through 3-370**	**Page 3-371 through 3-372**
Impact:	**Impact 3.8.3.3-2:** Growth media availability and quality necessary for the successful reclamation of the Project Area may decrease as a result of surface disturbance activities under the Proposed Action.	**Impact 3.8.3.4-2:** Growth media availability and quality necessary for the successful reclamation of the Project Area may decrease as a result of surface disturbance activities under the No Action Alternative.	**Impact 3.8.3.5-2:** Growth media availability and quality necessary for the successful reclamation of the Project Area may decrease as a result of surface disturbance activities under the Partial Backfill Alternative.	**Impact 3.8.3.6-2:** Growth media availability and quality necessary for the successful reclamation of the Project Area may decrease as a result of surface disturbance activities under the Off-Site Transfer of Ore Concentrate for Processing Alternative.	**Impact 3.8.3.7-2:** Growth media availability and quality necessary for the successful reclamation of the Project Area may decrease as a result of surface disturbance activities under the Slower, Longer Project Alternative.
Significance of the Impact:	**Significance of the Impact:** Based upon the implementation of the GMMP, this impact is not considered significant.	**Significance of the Impact:** Based upon the pre-existing soil conditions and the proven methods for growth media management that would be implemented under the No Action Alternative, this impact is considered less than significant, and no further mitigation measures are proposed.	**Significance of the Impact:** Based upon the implementation of the GMMP, which would provide sufficient growth media for use during reclamation of the additional 527 acres required under the Partial Backfill Alternative, this impact is not considered significant.	**Significance of the Impact:** Based upon the implementation of the GMMP, this impact is not considered.	**Significance of the Impact:** Based upon the implementation of the GMMP, this impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-367 through 3-367	**Page 3-368 through 3-368**	**Page 3-369 through 3-369**	**Page 3-370 through 3-371**	**Page 3-371 through 3-371**
Impact:	**Impact 3.8.3.3-3:** Surface disturbance activities under the Proposed Action would cause the unavoidable mixing of existing soil horizons that may decrease soil productivity.	**Impact 3.8.3.4-3:** Surface disturbing activities under the No Action Alternative would cause the unavoidable mixing of existing soil horizons that may decrease soil productivity.	**Impact 3.8.3.5-3:** Surface disturbing activities under the Partial Backfill Alternative would cause the unavoidable mixing of existing soil horizons that may decrease soil productivity.	**Impact 3.8.3.6-3:** Surface disturbance activities under the Off-Site Transfer of Ore Concentrate for Processing Alternative would cause the unavoidable mixing of existing soil horizons that may decrease soil productivity.	**Impact 3.8.3.7-3:** Surface disturbance activities under the Slower, Longer Project Alternative would cause the unavoidable mixing of existing soil horizons that may decrease soil productivity.
Significance of the Impact:	**Significance of the Impact:** Based upon the pre-existing soil conditions and the proven methods for growth media management that would be implemented under the Proposed Action, this impact is considered less than significant, and no further mitigation measures are proposed.	**Significance of the Impact:** Based upon the pre-existing soil conditions and the insignificant amount of surface disturbance that would be caused by the No Action Alternative, this impact is considered less than significant, and no further mitigation measures are proposed.	**Significance of the Impact:** Based upon the pre-existing soil conditions and the proven methods for growth media management that would be implemented under the Partial Backfill Alternative, this impact is not considered significant.	**Significance of the Impact:** Based upon the pre-existing soil conditions and the proven methods for growth media management that would be implemented under the Off-Site Transfer of Ore Concentrate for Processing Alternative, this impact is not considered significant.	**Significance of the Impact:** Based upon the pre-existing soil conditions and the proven methods for growth media management that would be implemented under the Slower, Longer Project Alternative, this impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
VEGETATION RESOURCES					
	Page 3-388 through 3-388	**Page 3-392 through 3-393**	**Page 3-393 through 3-393**	**Page 3-396 through 3-396**	**Page 3-398 through 3-398**
Impact:	**Impact 3.9.3.3-1:** Disturbance or removal of vegetation community types would occur as a direct result of the Proposed Action.	**Impact 3.9.3.4-1:** Implementation of the No Action Alternative would result in the general removal of vegetation.	**Impact 3.9.3.5-1:** Disturbance or removal of vegetation community types would occur as a result of the Partial Backfill Alternative.	**Impact 3.9.3.6-1:** Implementation of the Off-Site Transfer of Ore Concentrate for Processing Alternative would result in the general removal of vegetation.	**Impact 3.9.3.7-1:** Disturbance or removal of vegetation community types would occur as a result of the Slower, Longer Project Alternative.
Significance of the Impact:	**Significance of the Impact:** The impact would be considered less than significant because the disturbance would not occur all at once and would include concurrent reclamation.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	Page 3-390 through 3-390		**Page 3-393 through 3-393**	**Page 3-396 through 3-396**	**Page 3-398 through 3-398**
Impact:	**Impact 3.9.3.3-2:** Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.	N/A	**Impact 3.9.3.5-2**: Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.	**Impact 3.9.3.6-2:** Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.	**Impact 3.9.3.7-2:** Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	N/A	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-390 through 3-390		**Page 3-394 through 3-394**	**Page 3-396 through 3-396**	**Page 3-398 through 3-398**
Impact:	**Impact 3.9.3.3-3:** Vegetation in the immediate vicinity of the Project Area could suffer periodic short-term reductions in primary production due to airborne particulate deposition onto exposed surfaces.	N/A	**Impact 3.9.3.5-3**: Vegetation in the immediate vicinity of the Project Area could suffer periodic short-term reductions in primary production due to airborne particulate deposition onto exposed surfaces.	**Impact 3.9.3.6-3:** Vegetation in the immediate vicinity of the Project Area could suffer periodic short-term reductions in primary production due to airborne particulate deposition onto exposed surfaces.	**Impact 3.9.3.7-3:** Vegetation in the immediate vicinity of the Project Area could suffer periodic short-term reductions in primary production due to airborne particulate deposition onto exposed surfaces.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	N/A	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-390 through 3-391		**Page 3-394 through 3-394**	**Page 3-397 through 3-397**	**Page 3-399 through 3-399**
Impact:	**Impact 3.9.3.3-4:** The Project would result in limitations and enhancements to the BLM's fire management activities within the vicinity of the Project Area.	N/A	**Impact 3.9.3.5-4**: The Project would result in limitations and enhancements to the BLM's fire management activities within the vicinity of the Project Area.	**Impact 3.9.3.6-4:** The Project would result in limitations and enhancements to the BLM's fire management activities within the vicinity of the Project Area.	**Impact 3.9.3.7-4:** The Project would result in limitations and enhancements to the BLM's fire management activities within the vicinity of the Project Area.
Significance of the Impact:	**Significance of the Impact:** Based on the conclusions from the analysis, the impact is not significant. The following mitigation is proposed for this impact.	N/A	**Significance of the Impact:** conclusions from the analysis, the impact is not significant. The following mitigation is proposed for this impact.	**Significance of the Impact:** Based on the conclusions from the analysis, the impact is not significant. The following mitigation is proposed for this impact.	**Significance of the Impact:** Based on the conclusions from the analysis, the impact is not significant. The following mitigation is proposed for this impact.
Mitigation Measure:	**Mitigation Measure 3.9.3.3-4:** During periods of high fire danger, EML would utilize welding tents during welding activities along the pipeline or powerline routes in the Project Area	N/A	**Mitigation Measure 3.9.3.5-4:** During periods of high fire danger, EML would utilize welding tents during welding activities along the pipeline or powerline routes in the Project Area.	**Mitigation Measure 3.9.3.6-4:** During periods of high fire danger, EML would utilize welding tents during welding activities along the pipeline or powerline routes in the Project Area.	**Mitigation Measure 3.9.3.7-4:** During periods of high fire danger, EML would utilize welding tents during welding activities along the pipeline or powerline routes in the Project Area.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.9.3.3-4 would be effective at reducing the potential for Project activities to result in wildland fires.	N/A	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.9.3.5-4 would be effective at reducing the potential for Project activities to result in wildland fires.	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.9.3.6-4 would be effective at reducing the potential for Project activities to result in wildland fires.	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.9.3.7-4 would be effective at reducing the potential for Project activities to result in wildland fires.
	Page 3-391 through 3-391		**Page 3-394 through 3-395**	**Page 3-397 through 3-397**	**Page 3-399 through 3-399**
Impact:	**Impact 3.9.3.3-5:** Disturbance or removal of potential habitat for Beatley buckwheat and windloving buckwheat could occur as a result of the Proposed Action.	N/A	**Impact 3.9.3.5-5**: Disturbance or removal of potential habitat for Beatley buckwheat and windloving buckwheat could occur as a result of the Proposed Action.	**Impact 3.9.3.6-5:** Disturbance or removal of potential habitat for Beatley buckwheat and windloving buckwheat could occur as a result of the Off-Site Transfer of Ore Concentrate for Processing Alternative.	**Impact 3.9.3.7-5:** Disturbance or removal of potential habitat for Beatley buckwheat and windloving buckwheat could occur as a result of the Slower, Longer Project Alternative.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	N/A	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-391 through 3-391		**Page 3-394 through 3-394**	**Page 3-397 through 3-397**	**Page 3-399 through 3-399**
Impact:	**Impact 3.9.3.3-6:** Potential, unsurveyed habitat for least phacelia located outside of the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the potential habitat could potentially impact these species indirectly.	N/A	**Impact 3.9.3.5-6**: Potential, unsurveyed habitat for least phacelia located outside of the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the potential habitat could potentially impact these species indirectly.	**Impact 3.9.3.6-6:** Potential, unsurveyed habitat for least phacelia located outside of the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the potential habitat could potentially impact these species indirectly.	**Impact 3.9.3.7-6:** Potential, unsurveyed habitat for least phacelia located outside of the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the potential habitat could potentially impact these species indirectly.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	N/A	**Significance of the Impact:** The indirect impact of the Proposed Action to potential habitat of these species would not meet the significance criteria listed in Section 3.9.3.1.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The indirect impact of the Proposed Action to potential habitat of these species would not meet the significance criteria listed in Section 3.9.3.1.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-392 through 3-392		**Page 3-394 through 3-394**	**Page 3-397 through 3-398**	**Page 3-400 through 3-400**
Impact:	**Impact 3.9.3.3-7:** Occupied and potential habitat for the Monte Neva Indian paintbrush is not expected to experience water stress because it is located outside of the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. However, lowering of the water table in the occupied and potential habitat could potentially impact this species.	N/A	**Impact 3.9.3.5-7:** Occupied and potential habitat for the Monte Neva Indian paintbrush is not expected to experience water stress because it is located outside of the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. However, lowering of the water table in the occupied and potential habitat could potentially impact this species.	**Impact 3.9.3.6-7:** Occupied and potential habitat for the Monte Neva Indian paintbrush is not expected to experience water stress because it is located outside of the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. However, lowering of the water table in the occupied and potential habitat could potentially impact this species.	**Impact 3.9.3.7-7:** Occupied and potential habitat for the Monte Neva Indian paintbrush is not expected to experience water stress because it is located outside of the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. However, lowering of the water table in the occupied and potential habitat could potentially impact this species.
Significance of the Impact:	**Significance of the Impact:** No indirect impact from the Proposed Action is expected to this species or occupied habitat because they are located outside of the predicted water table drawdown. Yearly monitoring would be conducted for this species. If impacts to the species from the Project are detected mitigation would be developed by the BLM and EML.	N/A	**Significance of the Impact:** No indirect impact from the Proposed Action is expected to this species or occupied habitat because they are located outside of the predicted water table drawdown. Yearly monitoring would be conducted for this species. If impacts to the species from the Project are detected, mitigation would be developed by the BLM and EML.	**Significance of the Impact:** No indirect impact from the Off-Site Transfer of Ore Concentrate for Processing Alternative is expected to this species or occupied habitat because they are located outside of the predicted water table drawdown. Yearly monitoring would be conducted for this species. If impacts to the species from the Project are detected mitigation would be developed by the BLM and EML	**Significance of the Impact:** No indirect impact of the Proposed Action is expected to this species or occupied habitat because they are located outside of the predicted water table drawdown. Yearly monitoring would be conducted for this species. If impacts to the species from the Project are detected, mitigation would be developed by the BLM and EML.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
NOXIOUS WEEDS, INVASIVE & NONNATIVE SPECIES					
	Page 3-403 through 3-403		**Page 3-404 through 3-404**	**Page 3-405 through 3-405**	**Page 3-406 through 3-406**
Impact:	**Impact 3.10.3.3-1:** Implementation of the Proposed Action could result in the introduction and spread of noxious weeds, invasive and nonnative species.	N/A	**Impact 3.10.3.5-1:** Implementation of the Partial Backfill Alternative could result in the introduction and spread of noxious weeds, invasive and nonnative plant species.	**Impact 3.10.3.6-1:** Implementation of the Off-Site Transfer of Ore Concentrate for Processing Alternative could result in the introduction and spread of noxious weeds, invasive and nonnative plant species.	**Impact 3.10.3.7-1:** Implementation of the Slower, Longer Project Alternative could result in the introduction and spread of noxious weeds, invasive and nonnative plant species.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	N/A	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-403 through 3-403		**Page 3-404 through 3-404**	**Page 3-405 through 3-405**	**Page 3-406 through 3-406**
5Impact:	**Impact 3.10.3.3-2:** Phreatophyte vegetation, riparian corridors, and wet meadows would potentially experience changes in species composition and density due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Noxious weeds as well as invasive and nonnative species associated with existing surface disturbance or those transported into the phreatophytes, riparian corridors, and wet meadows could potentially invade areas that experience changes in species composition and density.	N/A	**Impact 3.10.3.5-2:** Phreatophyte vegetation, riparian corridors, and wet meadows would potentially experience changes in species composition and density due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Noxious weeds as well as invasive and nonnative species associated with existing surface disturbance or those transported into the phreatophytes, riparian corridors, and wet meadows could potentially invade areas that experience changes in species composition and density.	**Impact 3.10.3.6-2:** Phreatophyte vegetation, riparian corridors, and wet meadows would potentially experience changes in species composition and density due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Noxious weeds as well as invasive and nonnative species associated with existing surface disturbance or those transported into the phreatophytes, riparian corridors, and wet meadows could potentially invade areas that experience changes in species composition and density.	**Impact 3.10.3.7-2:** Phreatophyte vegetation, riparian corridors, and wet meadows would potentially experience changes in species composition and density due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Noxious weeds as well as invasive and nonnative species associated with existing surface disturbance or those transported into the phreatophytes, riparian corridors, and wet meadows could potentially invade areas that experience changes in species composition and density.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	N/A	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
WETLANDS/RIPARIAN ZONES					
	Page 3-409 through 3-409		**Page 3-412 through 3-412**	**Page 3-413 through 3-413**	**Page 3-415 through 3-415**
Impact:	**Impact 3.11.3.3-1:** The Project would not result in the removal or disturbance (direct impact) of wetlands in the Project Area.	N/A	**Impact 3.11.3.5-1:** The Partial Backfill Alternative would not result in the possible removal or disturbance of wetlands in the Project Area.	**Impact 3.11.3.6-1:** The Off-Site Transfer of Ore Concentrate for Processing Alternative would not result in the removal or disturbance of wetlands in the Project Area.	**Impact 3.11.3.7-1:** The Slower, Longer Project Alternative would not result in the removal or disturbance of wetlands in the Project Area.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	N/A	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-410 through 3-410		**Page 3-412 through 3-412**	**Page 3-413 through 3-414**	**Page 3-415 through 3-415**
Impact:	**Impact 3.11.3.3-2:** Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.	N/A	**Impact 3.11.3.5-2:** Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.	**Impact 3.11.3.6-2:** Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.	**Impact 3.11.3.7-2:** Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	N/A	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	**Mitigation Measure 3.11.3.6-2:** The BLM would provide EML with a list of appropriate seed mixes for those areas within and outside the Project Area impacted by water table drawdown that should be seeded. The nature of the seed mix may vary depending on the conditions encountered as a result of the drawdown. If there is insufficient water to support phreatophytes or aquatic-dependent species, the BLM may provide a salt scrub, or other appropriate, seed mix. The BLM would provide this seed mix at the time the mitigation would be implemented.	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.11.3.6-2 would reduce potential impacts to phreatophyte vegetation from water stress due to the water table drawdown during Project activities. Reseeding with appropriate seed mixes would reduce long-term impacts associated with the loss of phreatophyte vegetation.	N/A
	Page 3-410 through 3-411		**Page 3-412 through 3-413**	**Page 3-414 through 3-414**	**Page 3-415 through 3-416**
Impact:	**Impact 3.11.3.3-3:** Vegetation dependent on springs, seeps, and perennial streams (i.e., riparian vegetation) would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area where these plants are located would potentially cause a decline in the riparian vegetation community. Additionally, direct impacts to the 0.22 acre of riparian vegetation associated with the Zinc adit are expected from the Project.	N/A	**Impact 3.11.3.5-3:** Vegetation dependent on springs, seeps, and perennial streams (i.e., riparian vegetation) would potentially experience water stress due to the water table drawdown associated with mine dewatering and subsequent filling of the open pit. Lowering of the water table in the area where these plants are located would potentially cause a decline in the riparian vegetation community. Additionally, direct impacts to the 0.22 acre of riparian vegetation associated with the Zinc adit are expected from the Project.	**Impact 3.11.3.6-3:** Vegetation dependent on springs, seeps, and perennial streams (i.e., riparian vegetation) would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area where these plants are located would potentially cause a decline in the riparian vegetation community. Additionally, direct impacts to the 0.22 acre of riparian vegetation associated with the Zinc adit are expected from the Project.	**Impact 3.11.3.7-3:** Vegetation dependent on springs, seeps, and perennial streams (i.e., riparian vegetation) would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table in the area where these plants are located would potentially cause a decline in the riparian vegetation community. Additionally, direct impacts to the 0.22 acre of riparian vegetation associated with the Zinc adit are expected from the Project.
Significance of the Impact:	**Significance of the Impact:** Potential impacts to riparian vegetation areas within the area directly or indirectly affected by Project activities would be monitored as outlined in Section 2.1.15 and in the Plan. The impact is considered potentially significant.	N/A	**Significance of the Impact:** Potential impacts to riparian vegetation areas within the area directly or indirectly affected by Project activities would be monitored as outlined in Section 2.1.15 and the Plan. The impact is considered potentially significant.	**Significance of the Impact:** Potential impacts to riparian vegetation areas within the area directly or indirectly affected by Project activities would be monitored as outlined in Section 2.1.15 and the Plan. The impact is considered potentially significant.	**Significance of the Impact:** Potential impacts to riparian vegetation areas within the area directly or indirectly affected by Project activities would be monitored as outlined in the Plan. The impact is considered potentially significant.
Mitigation Measure:	**Mitigation Measure 3.11.3.3-3:** As stated in Mitigation Measure 3.2.3.3-2a specific mitigation for the two perennial stream segments and 22 perennial or potentially perennial spring sites are outlined in Table 3.2-9. Implementation of the mitigation outlined in this table would result in up to 46.3 acres of additional surface disturbance associated with the pipeline construction and maintenance. This supplemental water should sustain riparian vegetation. EML, in coordination with the BLM, would identify sites for mitigation in the area affected and implement mitigation measures at a three to one ratio with local cuttings, plugs, or seeds within one year of direct disturbance. EML would monitor these sites on an annual basis for at least three years after treatment to ensure effectiveness.	N/A	**Mitigation Measure 3.11.3.5-3:** As stated in Mitigation Measure 3.2.3.3-2a, specific mitigation for the two perennial stream segments and 22 perennial or potentially perennial spring sites are outlined in Table 3.2-9. Implementation of the mitigation outlined in this table would result in up to 46.3 acres of additional surface disturbance associated with the pipeline construction and maintenance. This supplemental water should sustain riparian vegetation. EML, in coordination with the BLM, would identify sites for mitigation in the area affected and implement mitigation measures at a three to one ratio with local cuttings, plugs, or seeds within one year of direct disturbance. EML would monitor these sites on an annual basis for at least three years after treatment to ensure effectiveness.	**Mitigation Measure 3.11.3.6-3:** As stated in Mitigation Measure 3.2.3.3-2a, specific mitigation for the two perennial stream segments and 22 perennial or potentially perennial spring sites are outlined in Table 3.2-9. Implementation of the mitigation outlined in this table would result in 46.3 acres of additional surface disturbance associated with the pipeline construction and maintenance. This supplemental water should sustain riparian vegetation. EML, in coordination with the BLM, would identify sites for mitigation in the area affected and implement mitigation measures at a three to one ratio with local cuttings, plugs, or seeds within one year of direct disturbance. EML would monitor these sites on an annual basis for at least three years after treatment to ensure effectiveness.	**Mitigation Measure 3.11.3.7-3:** As stated in Mitigation Measure 3.2.3.3-2a, specific mitigation for the two perennial stream segments and 22 perennial or potentially perennial spring sites are outlined in Table 3.2-9. Implementation of the mitigation outlined in this table would result in up to 46.3 acres of additional surface disturbance associated with the pipeline construction and maintenance. This supplemental water should sustain riparian vegetation. EML, in coordination with the BLM, would identify sites for mitigation in the area affected and implement mitigation measures at a three to one ratio with local cuttings, plugs, or seeds within one year of direct disturbance. EML would monitor these sites on an annual basis for at least three years after treatment to ensure effectiveness.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.2.3.3-2a is designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. Mitigation Measure 3.11.3.3-3 would reduce impacts to the loss of riparian vegetation during Project activities. Replacement with local cuttings, plugs, or seeds would ensure no long-term impacts to the loss of riparian vegetation.	N/A	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.2.3.3-2a is designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. Mitigation Measure 3.11.3.5-3 would reduce impacts to the loss of riparian vegetation during Project activities. Replacement with local cuttings, plugs, or seeds would ensure no long-term impacts to the loss of riparian vegetation.	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.2.3.3-2a is designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. Mitigation Measure 3.11.3.5-3 would reduce impacts to the loss of riparian vegetation during Project activities. Replacement with local cuttings, plugs, or seeds would ensure no long-term impacts to the loss of riparian vegetation.	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.2.3.3-2a is designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. Mitigation Measure 3.11.3.5-3 would reduce impacts to the loss of riparian vegetation during Project activities. Replacement with local cuttings, plugs, or seeds would ensure no long-term impacts to the loss of riparian vegetation.
LIVESTOCK GRAZING AND PRODUCTION					
	Page 3-423 through 3-423		**Page 3-427 through 3-427**	**Page 3-428 through 3-428**	**Page 3-431 through 3-431**
Impact:	**Impact 3.12.3.3-1:** Project development and operation under the Proposed Action would result in the permanent loss of 32 AUMs and the loss of 781 AUMs for approximately 70 years from allotments within the fenced Project Area.	N/A	**Impact 3.12.3.5-1:** Project development and operation under the Partial Backfill Alternative would result in the permanent loss of 32 AUMs and the loss of 781 AUMs for approximately 70 years from allotments within the fenced Project Area.	**Impact 3.12.3.6-1:** Project development and operation under the Off-Site Transfer of Ore Concentrate for Processing Alternative would result in the permanent loss of 32 AUMs and the loss of 781 AUMs for approximately 70 years from allotments within the fenced Project Area.	**Impact 3.12.3.7-1:** Project development and operation under the Slower, Longer Project Alternative would result in permanent loss of 32 AUMs and the loss of 781 AUMs for approximately 115 years from allotments within the Project Area.
Significance of the Impact:	**Significance of the Impact:** The impact is considered potentially significant.	N/A	**Significance of the Impact:** The impact is considered potentially significant.	**Significance of the Impact:** The impact is considered potentially significant.	**Significance of the Impact:** The impact is considered potentially significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-424 through 3-424		**Page 3-427 through 3-428**	**Page 3-429 through 3-430**	**Page 3-431 through 3-432**
Impact:	**Impact 3.12.3.3-2:** Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Although the lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities, it is possible that the changes in phreatophyte community would result in a loss of forage productivity. Impacts to other vegetation communities as a result of drawdown are not expected.	N/A	**Impact 3.12.3.5-2:** Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Although the lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities, it is possible that the changes in phreatophyte community would result in a loss of forage productivity. Impacts to other vegetation communities as a result of drawdown are not expected.	**Impact 3.12.3.6-2:** Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Although the lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities, it is possible that the changes in phreatophyte community would result in a loss of forage productivity. Impacts to other vegetation communities as a result of drawdown are not expected.	**Impact 3.12.3.7-2:** Phreatophyte vegetation would potentially experience a change in species composition and percent cover due to the predicted water table drawdown associated with ground water pumping and subsequent recovery of the water table. Although the lowering of the water table in the area of phreatophytes is not expected to result in a net loss of vegetation in these communities, it is possible that the changes in phreatophyte community would result in a loss of forage productivity. Impacts to other vegetation communities as a result of drawdown are not expected.
Significance of the Impact:	**Significance of the Impact:** The impact is considered potentially significant. The following mitigation has been identified for this impact.	N/A	**Significance of the Impact:** The impact is considered potentially significant. The following mitigation has been identified for this impact.	**Significance of the Impact:** The impact is considered potentially significant. The following mitigation has been identified for this impact.	**Significance of the Impact:** The impact is considered potentially significant. The following mitigation has been identified for this impact.
Mitigation Measure:	**Mitigation Measure 3.12.3.3-2:** The BLM would monitor for changes to forage productivity as a result of ground water drawdown associated with Project-related ground water pumping. If the BLM detects a loss of forage productivity attributed to the Project, the BLM would develop and provide EML with a list of appropriate seed mixes for those areas within and outside the Project Area impacted by water table drawdown that should be seeded. The nature of the seed mix may vary depending on the conditions encountered as a result of the drawdown. If the BLM determines reseeding to be necessary, the BLM would coordinate the conditions for reseeding (including a possible two-year grazing closure) with local permittees in order to reduce impacts to AUMs. Mitigation for the potential loss of water available for livestock from stock water rights and other surface waters are described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage).	N/A	**Mitigation Measure 3.12.3.5-2:** The BLM would monitor for changes to forage productivity as a result of ground water drawdown associated with Project-related ground water pumping. If the BLM detects a loss of forage productivity attributed to the Project, the BLM would develop and provide EML with a list of appropriate seed mixes for those areas within and outside the Project Area impacted by water table drawdown that should be seeded. The nature of the seed mix may vary depending on the conditions encountered as a result of the drawdown. If the BLM determines reseeding to be necessary, the BLM would coordinate the conditions for reseeding (including a possible two-year grazing closure) with local permittees in order to reduce impacts to AUMs. Mitigation for the potential loss of water available for livestock from stock water rights and other surface waters are described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage).	**Mitigation Measure 3.12.3.6-2:** The BLM would monitor for changes to forage productivity as a result of ground water drawdown associated with Project-related ground water pumping. If the BLM detects a loss of forage productivity attributed to the Project, the BLM would develop and provide EML with a list of appropriate seed mixes for those areas within and outside the Project Area impacted by water table drawdown that should be seeded. The nature of the seed mix may vary depending on the conditions encountered as a result of the drawdown. If the BLM determines reseeding to be necessary, the BLM would coordinate the conditions for reseeding (including a possible two-year grazing closure) with local permittees in order to reduce impacts to AUMs. Mitigation for the potential loss of water available for livestock from stock water rights and other surface waters are described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage).	**Mitigation Measure 3.12.3.7-2:** The BLM would monitor for changes to forage productivity as a result of ground water drawdown associated with Project-related ground water pumping. If the BLM detects a loss of forage productivity attributed to the Project, the BLM would develop and provide EML with a list of appropriate seed mixes for those areas within and outside the Project Area impacted by water table drawdown that should be seeded. The nature of the seed mix may vary depending on the conditions encountered as a result of the drawdown. If the BLM determines reseeding to be necessary, the BLM would coordinate the conditions for reseeding (including a possible two-year grazing closure) with local permittees in order to reduce impacts to AUMs. Mitigation for the potential loss of water available for livestock from stock water rights and other surface waters are described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage).
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Mitigation measure 3.12.3.3-2 would reduce potential impacts to local permittees from changes in vegetation species composition and percent cover as a result of water table drawdown during Project activities. Monitoring vegetation and possible reseeding with an appropriate seed mix, as well as BLM coordination with local	N/A	**Effectiveness of Mitigation and Residual Effects:** Mitigation measure 3.12.3.5-2 would reduce potential impacts to local permittees from changes in vegetation species composition and percent cover as a result of water table drawdown during Project activities. Monitoring vegetation and possible reseeding with an appropriate seed mix, as well as BLM coordination	**Effectiveness of Mitigation and Residual Effects:** Mitigation measure 3.12.3.6-2 would reduce potential impacts to local permittees from changes in vegetation species composition and percent cover as a result of water table drawdown during Project activities. Monitoring vegetation and possible reseeding with an appropriate seed mix, as well as BLM coordination	**Effectiveness of Mitigation and Residual Effects:** Mitigation measure 3.12.3.7-2 would reduce potential impacts to local permittees from changes in vegetation species composition and percent cover as a result of water table drawdown during Project activities. Monitoring vegetation and possible reseeding with an appropriate seed mix, as well as BLM coordination

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	permittees following reseeding, would reduce the long-term impacts to AUMs.		with local permittees following reseeding, would reduce the long-term impacts to AUMs.	with local permittees following reseeding, would reduce the long-term impacts to AUMs.	with local permittees following reseeding, would reduce the long-term impacts to AUMs.
	Page 3-425 through 3-425		**Page 3-428 through 3-428**	**Page 3-430 through 3-430**	**Page 3-432 through 3-432**
Impact:	**Impact 3.12.3.3-3:** Livestock dependent on existing water sources in the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table could result in reduced water available for use in rangeland management.	N/A	**Impact 3.12.3.5-3:** Livestock dependent on existing water sources in the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table could result in reduced water available for use in rangeland management.	**Impact 3.12.3.6-3:** Livestock dependent on existing water sources in the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table could result in reduced water available for use in rangeland management.	**Impact 3.12.3.7-3:** Livestock dependent on existing water sources in the Project Area would potentially experience water stress due to the water table drawdown associated with ground water pumping and subsequent recovery of the water table. Lowering of the water table could result in reduced water available for use in rangeland management.
Significance of the Impact:	**Significance of the Impact:** The impact could be potentially significant. The following mitigation has been identified for this impact.	N/A	**Significance of the Impact:** The impact could be potentially significant. The following mitigation has been identified for this impact.	**Significance of the Impact:** The impact could be potentially significant. The following mitigation has been identified for this impact.	**Significance of the Impact:** The impact could be potentially significant. The following mitigation has been identified for this impact.
Mitigation Measure:	**Mitigation Measure 3.12.3.3-3:** Mitigation for the potential loss of water availability for livestock from stock water rights and other surface waters are described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). Implementation of any of the specific mitigation outlined in these measures for springs located on private land would be subject to the authorization of the private land owner. Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage). Additionally, where livestock and wild horse use overlap those mitigation measures identified for wild horses (Mitigation Measure 3.13.3.3-1) would also benefit livestock.	N/A	**Mitigation Measure 3.12.3.5-3:** Mitigation for the potential loss of water availability for livestock is described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). Implementation of any of the specific mitigation outlined in these measures for springs located on private land would be subject to the authorization of the private land owner. Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage). Additionally, where livestock and wild horse use overlap those mitigation measures identified for wild horses (Mitigation Measure 3.13.3.3-1) would also benefit livestock.	**Mitigation Measure 3.12.3.6-3:** Mitigation for the potential loss of water availability for livestock is described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). Implementation of any of the specific mitigation outlined in these measures for springs located on private land would be subject to the authorization of the private land owner. Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage). Additionally, where livestock and wild horse use overlap those mitigation measures identified for wild horses (Mitigation Measure 3.13.3.3-1) would also benefit livestock.	**Mitigation Measure 3.12.3.7-3:** Mitigation for the potential loss of water availability for livestock from stock water rights and other surface waters is described in the Water Resources - Water Quantity impacts discussion (Mitigation Measures 3.2.3.3-2 and 3.2.3.3-3). Implementation of any of the specific mitigation outlined in these measures for springs located on private land would be subject to the authorization of the private land owner. Mitigation for loss of water available would also mitigate the loss of vegetation (livestock forage). Additionally, where livestock and wild horse use overlap those mitigation measures identified for wild horses (Mitigation Measure 3.13.3.3-1) would also benefit livestock.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measures in Section 3.2.3 would effectively mitigate any reductions in water available for use in rangeland management (i.e., this includes livestock grazing), with the exception of impacts to forage on private land associated with riparian areas. The BLM cannot require a private land owner to consent to the implementation of mitigation on their private land; therefore, there is a potential loss of forage associated with the riparian areas on private land. Ongoing monitoring included in the mitigation measures would ensure that adequate water supplies are maintained and available for livestock.	N/A	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measures in Section 3.2.3 would effectively mitigate any reductions in water available for use in rangeland management, with the exception of impacts to forage on private land associated with riparian areas. The BLM cannot require a private land owner to consent to the implementation of mitigation on their private land; therefore, there is a potential loss of forage associated with the riparian areas on private land. Ongoing monitoring included in the mitigation measures would ensure that adequate water supplies are maintained and available for livestock.	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measures in Section 3.2.3 would effectively mitigate any reductions in water available for use in rangeland management, with the exception of impacts to forage on private land associated with riparian areas. The BLM cannot require a private land owner to consent to the implementation of mitigation on their private land; therefore, there is a potential loss of forage associated with the riparian areas on private land. Ongoing monitoring included in the mitigation measures would ensure that adequate water supplies are maintained and available for livestock.	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measures in Section 3.2.3 would effectively mitigate any reductions in water available for use in rangeland management), with the exception of impacts to forage on private land associated with riparian areas. The BLM cannot require a private land owner to consent to the implementation of mitigation on their private land; therefore, there is a potential loss of forage associated with the riparian areas on private land. Ongoing monitoring included in the mitigation measures would ensure that adequate water supplies are maintained and available for livestock.
WILD HORSES					
	Page 3-438 through 3-440		**Page 3-444 through 3-444**	**Page 3-445 through 3-445**	**Page 3-446 through 3-447**
Impact:	**Impact 3.13.3.3-1:** Approximately 14,204 acres of wild horse habitat would be directly removed as a result of the fence. Approximately 232 acres of wild horse habitat in the Project Area would be potentially affected over the 44-year mine life and subsequent reclamation outside of the fenced portion of the Project, excluding approximately 124 acres associated with the powerline portion of the Project Area and 50 acres associated with exploration. The location of the 50 acres of surface disturbance associated with exploration cannot be determined at this time. The location of the 124 acres of surface disturbance associated with the powerline would occur with the powerline portion of the Project Area; however, the exact location of this disturbance has not been specified yet. The exact number of acres of surface disturbance for these two Project features within each HMA cannot be calculated at this time. Impacts to wild horses would also include a loss of access to water within the fenced portion of the Project Area. Impacts to wild horses could last approximately 70 years.	N/A	**Impact 3.13.3.5-1:** Approximately 14,204 acres of wild horse habitat would be directly removed as a result of the fence. Approximately 232 acres of wild horse habitat in the Project Area would be potentially affected over the 44-year mine life and subsequent reclamation outside of the fenced portion of the Project, excluding approximately 124 acres associated with the powerline portion of the Project Area and 50 acres associated with exploration. The location of the 50 acres of surface disturbance associated with exploration cannot be determined at this time. The location of the 124 acres of surface disturbance associated with the powerline would occur with the powerline portion of the Project Area; however, the exact location of this disturbance has not been specified yet. The exact number of acres of surface disturbance for these two Project features within each HMA cannot be calculated at this time. Impacts to wild horses would also include a loss of access to water within the fenced portion of the Project Area.	**Impact 3.13.3.6-1:** Approximately 14,204 acres of wild horse habitat would be directly removed as a result of the fence. Approximately 232 acres of wild horse habitat in the Project Area would be potentially affected over the 44-year mine life and subsequent reclamation outside of the fenced portion of the Project, excluding approximately 124 acres associated with the powerline portion of the Project Area and 50 acres associated with exploration. The location of the 50 acres of surface disturbance associated with exploration cannot be determined at this time. The location of the 124 acres of surface disturbance associated with the powerline would occur with the powerline portion of the Project Area; however, the exact location of this disturbance has not been specified yet. The exact number of acres of surface disturbance for these two Project features within each HMA cannot be calculated at this time. Impacts to wild horses would also include a loss of access to water within the fenced portion of the Project Area.	**Impact 3.13.3.7-1:** Approximately 14,204 acres of wild horse habitat would be directly removed as a result of the fence. Approximately 232 acres of wild horse habitat in the Project Area would be potentially affected over the extended mine life and subsequent reclamation outside of the fenced portion of the Project, excluding approximately 124 acres associated with the powerline portion of the Project Area and 50 acres associated with exploration. The location of the 50 acres of surface disturbance associated with exploration cannot be determined at this time. The location of the 124 acres of surface disturbance associated with the powerline would occur with the powerline portion of the Project Area; however, the exact location of this disturbance has not been specified yet. The exact number of acres of surface disturbance for these two Project features within each HMA cannot be calculated at this time. Impacts to wild horses would also include a loss of access to water within the fenced portion of the Project Area. Impacts to wild horses could last approximately twice as long as the Proposed Action.
Significance of the Impact:	**Significance of the Impact:** The impact is considered significant for wild horse access to water	N/A	**Significance of the Impact:** The impact is considered significant for wild horse access to water.	**Significance of the Impact:** The impact is considered significant for wild horse access to water.	**Significance of the Impact:** The impact is considered significant for wild horse access to water.
Mitigation Measure:	**Mitigation Measure 3.13.3.3-1:** Specific mitigation for surface water resources identified as being impacted by the Project is listed in Table 3.2-9. In order to further mitigate the loss of habitat and water sources to wild horses through the Project Area, EML would provide alternative water sources for wild horses. Six locations within the Whistler Mountain and Roberts Mountain HMAs have been identified in coordination with the BLM and would be developed as water sources for horses and could also be used by wildlife and livestock in areas historically used by wild horses (Figure 3.13.1). These sites consist of existing stock wells that are	N/A	**Mitigation Measure 3.13.3.5-1:** Mitigation under the Partial Backfill Alternative would be the same as mitigation under the Proposed Action.	**Mitigation Measure 3.13.3.6-1:** Mitigation under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as mitigation under the Proposed Action.	**Mitigation Measure 3.13.3.7-1:** Specific mitigation for surface water resources that has been identified as being impacted by the Project is listed in Tables 3.2-9 and 3.2-18. Otherwise, the mitigation under the Slower, Longer Project Alternative would be the same as mitigation under the Proposed Action.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	not currently functioning or do not have pumps or troughs and two new sources tapped from Project production wells. These sources would provide water where it has not been available previously or where availability has been limited. These sources would replace water sources located within the Project boundary fence that would no longer be available to wild horses. Distribution of wild horse use would also be improved. The Project's Mitigation Plan is included in this EIS as Appendix D. The development of these six sites is detailed in Appendix D, Attachment 2. Appendix D, Attachment 2 includes a description of how each site would be developed. The sites would be owned and operated by EML. Operations would include periodic inspections and maintenance, turning water on and off, and winterizing water sources as determined through coordination with the BLM. Upon Project completion, improvements associated with the stock watering wells and spring would remain in place for the continued support of wild horses, wildlife, and livestock within the HMAs and grazing allotments. EML would implement the mitigation plan in Appendix D, Attachment 2. Should EML decide not to retain ownership of the associated water rights, agreements would be reached at that time between EML, and those associated with the current grazing privileges on the specific allotment(s), NDOW, and BLM to transfer ownership of these improvements to the appropriate parties. The selection of new or replacement troughs and tanks would be based on design to reduce evaporation in the summer and reduce freezing in the winter. All pipelines from wellheads to the Project fenceline under this mitigation would be buried below the ground to avoid limiting wild horse movement. If Project activities caused a water source to become unavailable to wild horses, the Authorized Officer could require a new well to be drilled or another water development to be constructed in the general area to provide adequate water for the wild horses. Should monitoring indicate that wild horses were being negatively impacted by the mining activities, the Mount Lewis Field Manager could require additional measures for the protection of wild horses such as seasonal restrictions during the peak foaling period. Mitigation could include annual, biennial, or quarterly helicopter population inventory flights of the area in addition to on the ground monitoring by BLM and Project personnel. However, the use of a helicopter below 500 feet would not occur between March 1 and June 30 in order to prevent disruption during foaling period, causing orphaned or abandoned foals. Fences constructed around the Project Area would use white-topped steel posts. Additional reflectors may be necessary if problems with horses impacting fences occur. Fences should be continuous with no breaks (no drift fences). Horses climb steep or rocky terrain and may go around the ends of fences. Should horses be discovered within the fenced areas, Project personnel would contact the BLM immediately to assist with the removal of the horses. Wild horses could be fence-wise and difficult to push through gates or fence openings. This often results in horses attempting to jump fences and becoming cut by barbed wire. BLM staff have materials to assist in the removal of wild horses. Project personnel would not "haze" wild horses out of fenced areas. EML would avoid the BLM's Key Management Areas for vegetation monitoring established near Mount Hope and in Kobeh Valley. Additional mitigation for livestock grazing and production is summarized in Appendix D.				

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.13.3.3-1 would be effective to reduce any impacts to the loss of habitat or resources within the HMA to less than significant. The Mitigation Plan would also ensure the effectiveness of this mitigation measure (Appendix D).	N/A	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.13.3.5-1 would reduce any impacts to the loss of acreage or resources within the HMA to less than significant.	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.13.3.6-1 would reduce any impacts to the loss of acreage or resources within the HMA to less than significant. The Mitigation Plan would also ensure the effectiveness of this mitigation measure (Appendix D, Attachment 2).	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.13.3.7-1 would reduce any impacts to the loss of acreage or resources within the HMA to less than significant. The Mitigation Plan would also ensure the effectiveness of this mitigation measure (Appendix D, Attachment 2).
	Page 3-443 through 3-443		**Page 3-444 through 3-445**	**Page 3-445 through 3-446**	**Page 3-447 through 3-447**
Impact:	**Impact 3.13.3.3-2:** Project-related activities, such as the addition of a fence to the Project Area or noise from human presence, blasting, vehicular traffic, or other sources, associated with the Proposed Action could result in wild horse displacement and changes in wild horse use throughout the HMA for the 44-year Project life.	N/A	**Impact 3.13.3.5-2:** Project-related activities, such as the addition of a fence to the Project Area or noise from blasting or other sources, associated with the Partial Backfill Alternative could result in wild horse displacement and changes in wild horse use throughout the HMA for the life of the Project.	**Impact 3.13.3.6-2:** Project-related activities, such as the addition of a fence to the Project Area or noise from human presence, blasting, vehicular traffic, or other sources, associated with the Proposed Action could result in wild horse displacement and changes in wild horse use throughout the HMA for the life of the Project.	**Impact 3.13.3.7-2:** Project-related activities, such as the addition of a fence to the Project Area or noise from blasting or other sources, associated with the Slower, Longer Project Alternative could result in wild horse displacement and changes in wild horse use throughout the HMA for the duration of the Project, which would be twice as long as the Proposed Action.
Significance of the Impact:	**Significance of the Impact:** The mitigation outlined above and in Appendix D, Attachment 2 would reduce the potential impacts to the distribution of wild horses. This impact is not considered significant.	N/A	**Significance of the Impact:** The mitigation outlined above and in Appendix D, Attachment 2 would reduce the potential impacts to the distribution of wild horses. Impacts from the Partial Backfill Alternative would be the same as impacts from the Proposed Action.	**Significance of the Impact:** Impacts from the Partial Backfill Alternative would be the same as impacts from the Proposed Action. The mitigation outlined above and in Appendix D, Attachment 2 would reduce the potential impacts to the distribution of wild horses.	**Significance of the Impact:** Impacts from the Slower, Longer Project Alternative would be the same as impacts from the Proposed Action. The mitigation outlined above and in Appendix D, Attachment 2 would reduce the potential impacts to the distribution of wild horses.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
LAND USE					
	Page 3-455 through 3-455		**Page 3-459 through 3-459**	**Page 3-461 through 3-461**	**Page 3-464 through 3-464**
Impact:	**Impact 3.14.3.3-1:** Public lands currently utilized for livestock grazing, wild horse habitat, and mineral exploration would be removed from use as a result of the construction and operation of the Project. The Proposed Action would result in the removal of 14,204 acres from multiple use as a result of the Project facilities and fencing for the life of the Project. In addition, 8,355 acres of disturbance would occur within the fenced portion of the Project Area. Reclamation would be completed for 7,621 acres, or 91 percent, of the disturbed area (Section 2.1.17). Approximately 734 acres of public land in the vicinity of the open pit would not be reclaimed to the pre-mining land use.	N/A	**Impact 3.14.3.5-1:** Public lands currently utilized for livestock grazing, wild horse habitat, and mineral exploration would be removed from use as a result of the construction and operation of the Project. The Partial Backfill Alternative would result in the removal of 14,204 acres from multiple use as a result of the Project facilities and fencing. In addition, 8,355 acres of disturbance would occur within the fenced portion of the Project Area. Reclamation would be completed for 7,621 acres, or 91 percent, of the disturbed area (Section 2.1.17). Approximately 734 acres of public land in the vicinity of the open pit would be partially reclaimed, but not available to wildlife habitat pre-mining land use.	**Impact 3.14.3.6-1:** Public lands currently utilized for livestock grazing, wild horse habitat, and mineral exploration would be removed from use as a result of the construction and operation of the Project. The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in the removal of 14,204 acres from multiple use as a result of the Project facilities and fencing. In addition, 8,355 acres of disturbance would occur within the fenced portion of the Project Area. Reclamation would be completed for 7,621 acres, or 91 percent, of the disturbed area (Section 2.1.17). Approximately 734 acres of public land in the vicinity of the open pit would not be reclaimed to the pre-mining land use.	**Impact 3.14.3.7-1:** Public lands currently utilized for livestock grazing, wild horse habitat, and mineral exploration would be removed from use as a result of the construction and operation of the Project. The Slower, Longer Project Alternative would result in the removal of 14,204 acres from multiple use as a result of the Project facilities and fencing. In addition, 8,355 acres of disturbance would occur within the fenced portion of the Project Area. Reclamation would be completed for 7,621 acres, or 91 percent, of the disturbed area (Section 2.1.17). Approximately 734 acres of public land in the vicinity of the open pit would not be reclaimed to the pre-mining land use.
Significance of the Impact:	**Significance of the Impact:** This impact is not considered significant.	N/A	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-456 through 3-456		**Page 3-459 through 3-459**	**Page 3-462 through 3-462**	**Page 3-465 through 3-465**
Impact:	**Impact 3.14.3.3-2:** Public lands currently occupied by ROWs and other land use authorizations would be altered, which would result in the alteration or removal of up to 15 ROWs and other land use authorizations.	N/A	**Impact 3.14.3.5-2:** Public lands currently occupied by ROWs and land use authorizations would be altered, which would result in the alteration or removal of up to 15 ROWs and land use authorizations.	**Impact 3.14.3.6-2:** Public lands currently occupied by ROWs and land use authorizations would be altered, which would result in the alteration or removal of up to 15 ROWs and land use authorizations.	**Impact 3.14.3.7-2:** Public lands currently utilized for ROWs and other land use authorizations would be altered, which would result in the alteration or removal of up to 15 ROWs and other land use authorizations.
Significance of the Impact:	**Significance of the Impact:** This impact is considered less than significant; however, mitigation measures are considered appropriate.	N/A	**Significance of the Impact:** This impact is considered less than significant; however, mitigation measures are considered appropriate.	**Significance of the Impact:** This impact is considered less than significant; however mitigation measures are considered appropriate.	**Significance of the Impact:** This impact is considered less than significant; however, mitigation measures are considered appropriate.
Mitigation Measure:	**Mitigation Measure 3.14.3.3-2:** EML would, in consultation with the BLM and authorized holders of the affected ROWs, reestablish the structures that would be altered or removed, as appropriate.	N/A	**Mitigation Measure 3.14.3.5-2:** EML would, in consultation with the BLM and authorized holders of the affected ROWs, reestablish the structures that would be altered or removed, as appropriate.	**Mitigation Measure 3.14.3.6-2:** EML would, in consultation with the BLM and authorized holders of the affected ROWs, reestablish the structures that would be altered or removed, as appropriate.	**Mitigation Measure 3.14.3.7-2:** EML would, in consultation with the BLM and authorized holders of the affected ROWs and other land use authorizations, reestablish the structures that would be altered or removed, as appropriate.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Implementation of this mitigation measure would be effective at maintaining the impact level as less than significant by reestablishing the authorized structures that would be removed or altered during Project construction and operation.	N/A	**Effectiveness of Mitigation and Residual Effects:** Implementation of this mitigation measure would be effective at maintaining the impact level as less than significant by reestablishing the authorized structures that would be removed or altered during Project construction and operation.	**Effectiveness of Mitigation and Residual Effects:** Implementation of this mitigation measure would be effective at maintaining the impact level as less than significant by reestablishing the authorized structures that would be removed or altered during Project construction and operation.	**Effectiveness of Mitigation and Residual Effects:** Implementation of this mitigation measure would be effective at maintaining the impact level as less than significant by reestablishing the authorized structures that would be removed or altered during Project construction and operation.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	Page 3-457 through 3-457		**Page 3-460 through 3-460**	**Page 3-463 through 3-463**	**Page 3-466 through 3-466**
Impact:	**Impact 3.14.3.3-3:** The Proposed Action would have a potential indirect effect to private land uses as a result of ground water drawdown.	N/A	**Impact 3.14.3.5-3:** The Partial Backfill Alternative would have a potential indirect effect to private land uses as a result of ground water drawdown.	**Impact 3.14.3.6-3:** The Off-Site Transfer of Ore Concentrate for Processing Alternative would have a potential indirect effect to private land uses as a result of ground water drawdown.	**Impact 3.14.3.7-3:** The Slower. Longer Project Alternative would have a potential indirect effect to private land uses as a result of ground water drawdown.
Significance of the Impact:	**Significance of the Impact:** This impact is considered potentially significant; however, mitigation measures described in Section 3.2.3 are considered appropriate to reduce the impact to less than significant. No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures. See Section 3.26 for suggested mitigation outside the BLM's jurisdiction.	N/A	**Significance of the Impact:** This impact is considered potentially significant; however, mitigation measures described in Section 3.2.3 are considered appropriate to reduce the impact to less than significant. No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures. See Section 3.26 for suggested mitigation outside the BLM's jurisdiction.	**Significance of the Impact:** This impact is considered potentially significant; however, mitigation measures described in Section 3.2.3 are considered appropriate to reduce the impact to less than significant. No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures. See Section 3.26 for suggested mitigation outside the BLM's jurisdiction.	**Significance of the Impact:** This impact is considered potentially significant; however, mitigation measures described in Section 3.2.3 are considered appropriate to reduce the impact to less than significant. No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures. See Section 3.26 for suggested mitigation outside the BLM's jurisdiction.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
RECREATION AND WILDERNESS STUDY AREAS					
	Page 3-475 through 3-475	**Page 3-477 through 3-477**	**Page 3-477 through 3-477**	**Page 3-479 through 3-479**	**Page 3-480 through 3-480**
Impact:	**Impact 3.15.3.3-1:** Public lands within the fenced portion of the Project Area (14,204 acres) potentially used for dispersed recreation would be removed from use in the short term as a result of the construction and operation of the Project.	**Impact 3.15.3.4-1:** Public lands potentially used for dispersed recreation adjacent to the mineral exploration and data acquisition areas would be removed from use for the duration of those activities.	**Impact 3.15.3.5-1:** Public lands within the fenced portion of the Project Area (14,204 acres) potentially used for dispersed recreation would be removed from use in the short term as a result of the construction and operation of the Project.	**Impact 3.15.3.6-1:** Public lands within the fenced portion of the Project Area (14,204 acres) potentially used for dispersed recreation would be removed from use in the short term as a result of the construction and operation of the Project.	**Impact 3.15.3.7-1:** Public lands within the fenced portion of the Project Area (14,204 acres) potentially used for dispersed recreation would be removed from use in the short-term as a result of the construction and operation of the Project.
Significance of the Impact:	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.15.3.1.	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.15.3.1.	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.15.3.1.	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.15.3.1.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-476 through 3-476		**Page 3-478 through 3-478**	**Page 3-479 through 3-479**	**Page 3-481 through 3-481**
Impact:	**Impact 3.15.3.3-2:** A total of 734 acres within the Project Area would be closed to public access and users in the long term.	N/A	**Impact 3.15.3.5-2:** A total of 734 acres within the Project Area would be closed to public access and users in the long term through the installation of the berms and fencing.	**Impact 3.15.3.6-2:** A total of 734 acres within the Project Area would be closed to public access and users in the long term through the installation of the berms and fencing.	**Impact 3.15.3.7-2:** A total of 734 acres within the Project Area would be closed to public access and users in the long-term.
Significance of the Impact:	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.15.3.1.	N/A	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.15.3.1.	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.15.3.1.	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.15.3.1.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-476 through 3-476		**Page 3-478 through 3-478**	**Page 3-479 through 3-480**	**Page 3-481 through 3-481**
Impact:	**Impact 3.15.3.3-3:** Public lands, developed recreation sites, and community recreation facilities would be impacted by increased use and demand.	N/A	**Impact 3.15.3.5-3:** Public lands, developed recreation sites, and community recreation facilities would be impacted by increased use and demand.	**Impact 3.15.3.6-3:** Public lands, developed recreation sites, and community recreation facilities would be impacted by increased use and demand.	**Impact 3.15.3.7-3:** Public lands, developed recreation sites, and community recreation facilities would be impacted by increased use and demand.
Significance of the Impact:	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.15.3.1.	N/A	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.15.3.1.	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.15.3.1.	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.15.3.1.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
AUDITORY RESOURCES					
	Page 3-491 through 3-491		**Page 3-493 through 3-493**	**Page 3-496 through 3-496**	**Page 3-498 through 3-498**
Impact:	**Impact 3.16.3.3-1:** Ambient noise levels associated with the Proposed Action could be increased and affect ambient noise levels at the nearest ranch houses and residences.	N/A	**Impact 3.16.3.5-1:** Ambient noise levels associated with the Partial Backfill Alternative could be increased and affect ambient noise levels at the nearest ranch houses or residences.	**Impact 3.16.3.6-1:** Ambient noise levels associated with the Off-Site Transfer of Ore Concentrate for Processing Alternative could be increased and affect ambient noise levels at the nearest ranch houses or residences.	**Impact 3.16.3.7-1:** Ambient noise levels associated with the Slower, Longer Project Alternative could be increased and affect ambient noise levels at the nearest ranch houses.
Significance of the Impact:	**Significance of the Impact:** The predicted changes in hourly ambient noise levels at the nearest ranch houses are 1 dB or less. The impact would be similar at the residences in Diamond Valley because of the similar distances from the Project activities. This impact would be considered less than significant.	N/A	**Significance of the Impact:** The predicted changes in hourly ambient noise levels at the nearest ranch houses are 1 dB or less. The impact would be similar at the residences in Diamond Valley. This impact would be considered less than significant.	**Significance of the Impact:** The predicted changes in hourly ambient noise levels at the nearest ranch houses are 1 dB or less. The impact would be similar at the residences in Diamond Valley. This impact would be considered less than significant.	**Significance of the Impact:** The predicted changes in hourly ambient noise levels at the nearest ranch houses are 1 dB or less and would be considered less than significant.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-491 through 3-491		**Page 3-494 through 3-494**	**Page 3-496 through 3-496**	**Page 3-498 through 3-498**
Impact:	**Impact 3.16.3.3-2:** Project-related noise levels associated with the Proposed Action could be increased to noise levels that would be less than 55 dBA as measured at a sensitive receptor site.	N/A	**Impact 3.16.3.5-2:** Project-related noise levels associated with the Partial Backfill Alternative could be increased to noise levels that are less than 55 dBA as measured at a sensitive receptor site.	**Impact 3.16.3.6-2:** Project-related noise levels associated with the Off-Site Transfer of Ore Concentrate for Processing Alternative could be increased to noise levels to less than 55 dBA as measured at a sensitive receptor site.	**Impact 3.16.3.7-2:** Project-related noise levels associated with the Slower, Longer Project Alternative could be increased to noise levels in excess of 55 dBA measured at a sensitive receptor site.
Significance of the Impact:	**Significance of the Impact:** The impact would be considered less than significant.	N/A	**Significance of the Impact:** The impact would be considered less than significant.	**Significance of the Impact:** The impact would be considered less than significant.	**Significance of the Impact:** The impact would be considered less than significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-491 through 3-491		**Page 3-494 through 3-494**	**Page 3-496 through 3-496**	**Page 3-498 through 3-498**
Impact:	**Impact 3.16.3.3-3:** The Proposed Action would cause increases in traffic noise levels.	N/A	**Impact 3.16.3.5-3:** The Partial Backfill Alternative would cause increases in traffic noise levels.	**Impact 3.16.3.6-3:** The Off-Site Transfer of Ore Concentrate for Processing Alternative would cause increases in traffic noise levels.	**Impact 3.16.3.7-3:** The Slower, Longer Project Alternative would cause increases in traffic noise levels.
Significance of the Impact:	**Significance of the Impact:** The predicted changes in traffic noise levels are less than 3 dB where the existing traffic noise level exceeds 60 dB L_{dn}; therefore, the predicted changes in traffic noise levels due to the Proposed Action would be less than significant. The predicted Project-related mining and processing noise level in the vicinity of the Project access road and SR 278 is approximately 39 dB L_{dn}. This level of noise would not cause a significant change in ambient noise levels at that location in terms of L_{dn}, since the existing traffic noise would be nearly 20 dB higher than the mining and processing noise level.	N/A	**Significance of the Impact:** The predicted changes in traffic noise levels are less than 3 dB where the existing traffic noise level exceeds 60 dB L_{dn}; therefore, the predicted changes in traffic noise levels due to the Partial Backfill Alternative would be less than significant. The predicted Project-related mining and processing noise level in the vicinity of the Project access road and SR 278 is approximately 39 dB L_{dn}. This level of noise would not cause a significant change in ambient noise levels at that location in terms of L_{dn}, since the existing traffic noise would be nearly 20 dB higher than the mining and processing noise level.	**Significance of the Impact:** The predicted changes in traffic noise levels are less than 3 dB where the existing traffic noise level exceeds 60 dB L_{dn}; therefore, the predicted changes in traffic noise levels due to the Off-Site Transfer of Ore Concentrate for Processing Alternative would be less than significant. The predicted Project-related mining and processing noise level in the vicinity of the Project access road and SR 278 is approximately 39 dB L_{dn}. This level of noise would not cause a significant change in ambient noise levels at that location in terms of L_{dn}, since the existing traffic noise would be nearly 20 dB higher than the mining and processing noise level.	**Significance of the Impact:** The predicted changes in traffic noise levels are less than 3 dB where the existing traffic noise level exceeds 60 dB L_{dn}; therefore, the predicted changes in traffic noise levels due to the Slower, Longer Project Alternative would be less than significant. The predicted Project-related mining and processing noise level in the vicinity of the Project access road and SR 278 is approximately 39 dB L_{dn}. This level of noise would not cause a significant change in ambient noise levels at that location in terms of L_{dn}, since the existing traffic noise would be nearly 20 dB higher than the mining and processing noise level.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-491 through 3-492		**Page 3-494 through 3-495**	**Page 3-496 through 3-497**	**Page 3-498 through 3-499**
Impact:	**Impact 3.16.3.3-4:** The Proposed Action would cause increases in noise levels that could impact local residences through construction activities or poorly maintained construction equipment. The maximum noise levels received at the nearest ranch house, which is approximately two miles away from the nearest areas where grading would occur, would be reduced by approximately 23 dB as compared to the values shown on Table 3.16-6, ignoring sound absorption or any shielding provided by topography; therefore, maximum construction noise levels at the nearest ranch house would be in the range of approximately 47 to 67 dB. In practice, considering the topography of the Project Area, much of the construction equipment would be shielded from view of the nearest ranch house by topography. In those cases, the construction noise levels would be further reduced by 5 to 10 dB or greater.	N/A	**Impact 3.16.3.5-4:** The Partial Backfill Alternative would cause increases in noise levels that could impact local residences through construction activities or poorly maintained construction equipment. The maximum noise levels received at the nearest ranch house, which is approximately two miles away from the nearest areas where grading would occur, would be reduced by approximately 23 dB as compared to the values shown on Table 3.16-6, ignoring sound absorption or any shielding provided by topography; therefore, maximum construction noise levels at the nearest ranch house would be in the range of approximately 47 to 67 dB. In practice, considering the topography of the Project Area, much of the construction equipment would be shielded from view of the nearest ranch house by topography. In those cases, the construction noise levels would be further reduced by five to 10 dB or greater.	**Impact 3.16.3.6-4:** The Off-Site Transfer of Ore Concentrate for Processing Alternative would cause increases in noise levels that could impact local residences through construction activities or poorly maintained construction equipment. The maximum noise levels received at the nearest ranch house, which is approximately two miles away from the nearest areas where grading would occur, would be reduced by approximately 23 dB as compared to the values shown on Table 3.16-6, ignoring sound absorption or any shielding provided by topography; therefore, maximum construction noise levels at the nearest ranch house would be in the range of approximately 47 to 67 dB. In practice, considering the topography of the Project Area, much of the construction equipment would be shielded from view of the nearest ranch house by topography. In those cases, the construction noise levels would be further reduced by five to 10 dB or greater.	**Impact 3.16.3.7-4:** The Slower, Longer Project Alternative would cause increases in noise levels that could impact local residences through construction activities or poorly maintained construction equipment. The maximum noise levels received at the nearest ranch house, which is approximately two miles away from the nearest areas where grading would occur, would be reduced by approximately 23 dB as compared to the values shown on Table 3.16-6, ignoring sound absorption or any shielding provided by topography; therefore, maximum construction noise levels at the nearest ranch house would be in the range of approximately 47 to 67 dB. In practice, considering the topography of the Project Area, much of the construction equipment would be shielded from view of the nearest ranch house by topography. In those cases, the construction noise levels would be further reduced by 5 to 10 dB or greater.
Significance of the Impact:	**Significance of the Impact:** Noise levels produced by construction activities or poorly maintained construction equipment in the vicinity of the Roberts Creek Ranch house could be significant if such activities occurred at nighttime or if the noise level exceeds 55 dB.	N/A	**Significance of the Impact:** Noise levels produced by construction activities or poorly maintained construction equipment in the vicinity of the Roberts Creek Ranch house could be significant if such activities occurred at nighttime or if the noise level exceeds 55 dB.	**Significance of the Impact:** Noise levels produced by construction activities or poorly maintained construction equipment in the vicinity of the Roberts Creek Ranch house could be significant if such activities occurred at nighttime or if the noise level exceeds 55 dB.	**Significance of the Impact:** Noise levels produced by construction activities or poorly maintained construction equipment in the vicinity of the Roberts Creek Ranch house could be significant if such activities occurred at nighttime or if the noise level exceeds 55 dB.
Mitigation Measure:	**Mitigation Measure 3.16.3.3-4:** Construction in the vicinity of the Roberts Creek Ranch house and greater sage-grouse leks would be limited to daylight hours and would be limited during lekking periods (see Appendix D, Attachment 3). Construction equipment used in the vicinity of residences would be fitted with the best available technology manufacturers' noise control equipment,	N/A	**Mitigation Measure 3.16.3.5-4:** Construction in the vicinity of the Roberts Creek Ranch house or greater sage-grouse leks would be limited to daylight hours and would be limited during lekking periods (see Appendix D, Attachment 3). Construction equipment used in the vicinity of residences would be fitted with the best available technology manufacturers' noise control	**Mitigation Measure 3.16.3.6-4:** Construction in the vicinity of the Roberts Creek Ranch house or greater sage-grouse leks would be limited to daylight hours and would be limited during lekking periods (see Appendix D, Attachment 3). Construction equipment used in the vicinity of residences would be fitted with the best available technology manufacturers' noise control	**Mitigation Measure 3.16.3.7-4:** Construction in the vicinity of the Roberts Creek Ranch house or greater sage-grouse leks would be limited to daylight hours and would be limited during lekking periods (see Appendix D, Attachment 3). Construction equipment used in the vicinity of residences would be fitted with the best available technology manufacturers' noise control

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	including engine exhaust silencers and acoustical enclosures. Noise control equipment would be maintained in good working order. Implementation of this mitigation measure would result in a less than significant impact.		equipment, including engine exhaust silencers and acoustical enclosures. Noise control equipment would be maintained in good working order.	equipment, including engine exhaust silencers and acoustical enclosures. Noise control equipment would be maintained in good working order. Implementation of this mitigation measure would result in a less than significant impact.	equipment, including engine exhaust silencers and acoustical enclosures. Noise control equipment would be maintained in good working order. Implementation of this mitigation measure would result in a less than significant impact.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** The implementation of this mitigation measure would be effective at reducing the potential impact to less than significant by controlling the generation of the noise.	N/A	**Effectiveness of Mitigation and Residual Effects:** The implementation of this mitigation measure would be effective at reducing the potential impact to less than significant by controlling the generation of the noise.	**Effectiveness of Mitigation and Residual Effects:** The implementation of this mitigation measure would be effective at reducing the potential impact to less than significant by controlling the generation of the noise.	**Effectiveness of Mitigation and Residual Effects:** The implementation of this mitigation measure would be effective at reducing the potential impact to less than significant by controlling the generation of the noise.
	Page 3-492 through 3-492		**Page 3-495 through 3-495**	**Page 3-497 through 3-497**	**Page 3-499 through 3-499**
Impact:	**Impact 3.16.3.3-5:** Noise caused by blasting during construction and mining could cause annoyance if residents were startled by unexpected blasts, or if blasting overpressures caused rattling of residence windows. The Proposed Action would not otherwise impact auditory resources associated with blasting.	N/A	**Impact 3.16.3.5-5:** Noise caused by blasting during construction and mining could cause annoyance if residents were startled by unexpected blasts, or if blasting overpressures caused rattling of residence windows. The Partial Backfill Alternative would not otherwise impact auditory resources associated with blasting.	**Impact 3.16.3.6-5:** Noise caused by blasting during construction and mining could cause annoyance if residents were startled by unexpected blasts, or if blasting overpressures caused rattling of residence windows. The Off-Site Transfer of Ore Concentrate for Processing Alternative would not otherwise impact auditory resources associated with blasting.	**Impact 3.16.3.7-5:** Noise caused by blasting during construction and mining could cause annoyance if residents were startled by unexpected blasts, or if blasting overpressures caused rattling of residence windows. The Slower, Longer Project Alternative would not otherwise impact auditory resources associated with blasting.
Significance of the Impact:	**Significance of the Impact:** This impact is not considered significant.	N/A	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.	**Significance of the Impact:** This impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Page 3-492 through 3-492		**Page 3-495 through 3-495**	**Page 3-497 through 3-497**	**Page 3-499 through 3-499**
Impact:	**Impact 3.16.3.3-6:** The Proposed Action could generate flyrock. However, Project design would limit the potential for flyrock to travel beyond the Project fence.	N/A	**Impact 3.16.3.5-6:** The Proposed Action could generate flyrock. However, Project design would limit the potential for flyrock to travel beyond the Project fence.	**Impact 3.16.3.6-6:** The Proposed Action could generate flyrock. However, Project design would limit the potential for flyrock to travel beyond the Project fence.	**Impact 3.16.3.7-6:** The Proposed Action could generate flyrock. However, Project design would limit the potential for flyrock to travel beyond the Project fence.
Significance of the Impact:	**Significance of the Impact:** This impact would not be considered significant.	N/A	**Significance of the Impact:** This impact would not be considered significant.	**Significance of the Impact:** This impact would not be considered significant.	**Significance of the Impact:** This impact would not be considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	SOCIOECONOMIC VALUES				
	Pages 3-537 through 3-537		**Pages 3-565 through 3-565**	**Pages 3-567 through 3-567**	**Pages 3-570 through 3-570**
Impact:	**Impact 3.17.3.3-1**: The Proposed Action would result in substantial long-term expansion of most sectors of the southern Eureka County economy, especially the mining, retail and service sectors. The construction sector would also undergo substantial expansion during Project construction and the initial years of operations as local housing, commercial and community infrastructure is built to accommodate the Project workforce. The Project-related economic and employment opportunities would be seen as beneficial by many at the regional and local levels. Locally, the substantially increased labor demand during construction and the initial period of operations could result in competition for workers and upward pressure on wages, primarily during Project construction and early operations, which could be seen as adverse for some public and private sector employers, particularly those that would not benefit economically from development of the Project. For local and regional residents, the increased opportunity for high-paying employment would be considered beneficial. There is potential that competition for motel rooms and RV parks could affect businesses that depend specifically on tourism and recreation visitors (e.g., gift shops and tourist attractions) but those effects would likely be temporary during the construction phase of the Project. There has been concern among Diamond Valley agricultural interests that the Project could affect the quantity of water available for irrigation, which would in turn result in adverse effects on the agricultural sector of the local economy. The monitoring and mitigation measures outlined in Sections 2.1.16 and Section 3.2 of this EIS are intended to avoid or reduce potential adverse effects on ground water in Diamond Valley.	N/A	**Impact 3.17.3.5-1**: The Partial Backfill Alternative would result in substantial economic expansion similar to the Proposed Action. Project employment levels would be somewhat higher in the later years of Project operations.	**Impact 3.17.3.6-1**: The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in substantial demand for employees and compete with regional employers for workers.	**Impact 3.17.3.7-1**: The Slower, Longer Project Alternative would generate substantial expansion of the southern Eureka County economy similar to the Proposed Action, but at a somewhat lower rate and for a substantially longer period of time. This alternative would similarly result in substantial demand for employees but at a somewhat lower level (fewer employees) and longer period of time than the Proposed Action. Labor competition during construction and early operations would be slightly less than the Proposed Action.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	The Project would diversify the local mining sector by adding a new commodity.				
Significance of the Impact:	**Significance of the Impact**: The degree of this impact is considered significant. Impacts would be both beneficial and adverse. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	N/A	**Significance of the Impact**: This impact is considered significant; however, no mitigation measures are proposed. Continued employment of an existing workforce is likely to be viewed as beneficial. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	**Significance of the Impact**: This impact is considered significant. Continued employment of an existing workforce is likely to be viewed as beneficial. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	**Significance of the Impact**: This impact is considered significant. Continued employment of an existing workforce would likely to be viewed as beneficial. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Pages 3-542 through 3-542		**Pages 3-565 through 3-565**	**Pages 3-567 through 3-567**	**Pages 3-570 through 3-570**
Impact:	**Impact 3.17.3.3-2**: The Proposed Action would result in substantial growth and concentration of population. Population growth would present new economic opportunities for southern Eureka County businesses and support additional commercial development. These effects would be seen as positive for some. The changes from the current relatively stable and smaller population would be seen as adverse by others.	N/A	**Impact 3.17.3.5-2**: The Partial Backfill Alternative would result in substantial growth and concentration of population.	**Impact 3.17.3.6-2**: The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in substantial growth and concentration of population.	**Impact 3.17.3.7-2**: The Slower, Longer Project Alternative would result in a substantial growth and concentration of population. Project-related population would be somewhat lower than under the Proposed Action, but the population would remain in the area for a substantially longer period of time.
Significance of the Impact:	**Significance of the Impact**: This impact is considered a significant effect on social and economic values. The impact has both positive and potentially adverse, short term and long term, attributes. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	N/A	**Significance of the Impact**: This impact is considered significant. This impact is likely to be viewed as beneficial as it would delay community population losses associated with mine closure. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	**Significance of the Impact**: This impact is considered significant. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	**Significance of the Impact**: This impact is considered significant. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Pages 3-547 through 3-547		**Pages 3-565 through 3-565**	**Pages 3-567 through 3-567**	**Pages 3-570 through 3-570**
Impact:	**Impact 3.17.3.3-3**: The Proposed Action would result in substantial demand for housing in southern Eureka County. Absent a housing plan and development program, adequate housing is unlikely to be available during Project construction and the early years of Project operations. A housing shortage would likely result in additional daily and weekly commuting during construction and early Project operations and could inflate housing costs and rents, adversely affecting renters with fixed incomes. The substantial investment and associated economic opportunities generated in response to housing demand would be seen as beneficial by some in the community as would the expansion of the housing stock. Landlords would likely view increased housing costs as beneficial, renters and prospective buyers would view increased costs as adverse.	N/A	**Impact 3.17.3.5-3**: The Partial Backfill Alternative would result in substantial demand for new housing.	**Impact 3.17.3.6-3**: The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in substantial demand for new housing.	**Impact 3.17.3.7-3**: The Slower, Longer Project Alternative would result in substantial demand for new housing. Project-related housing demand would be somewhat lower than under the Proposed Action, but occur over a substantially longer period of time. As noted in Section 3.17.3.2.3, the decrease in housing demand over a 20-year period during the reduction in mining activities and eventual closure could place a large number of housing units on the market, potentially depressing housing values in the area. Potentially negative effects of Project closure on the southern Eureka County housing market would be substantially delayed under this alternative compared to the Proposed Action.
Significance of the Impact:	**Significance of the Impact**: This impact is considered significant and has both beneficial and potentially adverse aspects. Nevertheless, it is suggested that EML and Eureka County build on previous and current planning efforts to develop housing resources to accommodate the needs of the construction and operations-related population. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	N/A	**Significance of the Impact**: This impact is considered significant. This impact is likely to be viewed as beneficial as it would delay potential adverse effects on the southern Eureka County housing market. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	**Significance of the Impact**: This impact is considered significant. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	**Significance of the Impact**: This impact is considered significant. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	Pages 3-556 through 3-556		**Pages 3-566 through 3-566**	**Pages 3-567 through 3-568**	**Pages 3-570 through 3-571**
Impact:	**Impact 3.17.3.3-4**: The Proposed Action would result in a substantial demand for public infrastructure and services in southern Eureka County. Expansion and improvement of public infrastructure and services could in some cases provide a higher level of services for current residents and the associated expansion of infrastructure could support the County's long-term community and economic development plans. Conversely the substantial expansion of County services and infrastructure to support Project-related demand would be required over a relatively short period of time and likely strain the resources of County government.	N/A	**Impact 3.17.3.5-4**: The Partial Backfill Alternative would result in a substantial demand for public services.	**Impact 3.17.3.6-4**: The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in a substantial demand for public services.	**Impact 3.17.3.7-4**: The Slower, Longer Project Alternative would result in substantial demand for public infrastructure and services, although at a somewhat lower level than under the Proposed Action; however, demand would occur over a substantially longer period.
Significance of the Impact:	**Significance of the Impact**: This impact is considered significant and has both beneficial and potentially adverse aspects. Nevertheless, it is suggested that EML and Eureka County build on previous and current planning efforts to address public infrastructure and service issues. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	N/A	**Significance of the Impact**: This impact is considered significant and has both beneficial and potentially adverse aspects. Nevertheless, it is suggested that EML and Eureka County build on previous and current planning efforts to address public infrastructure and service issues. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	**Significance of the Impact**: This impact is considered significant and has both beneficial and potentially adverse aspects. Nevertheless, it is suggested that EML and Eureka County build on previous and current planning efforts to address public infrastructure and service issues. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	**Significance of the Impact**: This impact is considered significant and has both beneficial and potentially adverse aspects. Nevertheless, it is suggested that EML and Eureka County build on previous and current planning efforts to address public infrastructure and service issues. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Pages 3-560 through 3-560		**Pages 3-566 through 3-566**	**Pages 3-568 through 3-568**	**Pages 3-571 through 3-571**
Impact:	**Impact 3.17.3.3-5**: The Proposed Action would result in substantial short- and long-term increases in tax revenues as well as expenditures for Eureka County and ECSD.	N/A	**Impact 3.17.3.5-5**: The Partial Backfill Alternative would result in a substantial increase in revenues and expenditures for Eureka County and the ECSD.	**Impact 3.17.3.6-5**: The Off-Site Transfer of Ore Concentrate for Processing Alternative would result in a decrease in revenues and expenditures for Eureka County and the ECSD, compared to the Proposed Action.	**Impact 3.17.3.7-5**: Similar to the other action alternatives, the Slower, Longer Project Alternative would result in a substantial increase in revenues and expenditures for Eureka County and the ECSD, but the revenues would be less on an annual basis and accrue over a substantially longer period of time. At the same time, the demand on services and need for expenditures would also be lower but extend over a longer period, as compared to the Proposed Action.
Significance of the Impact:	**Significance of the Impact**: This impact is considered significant. While the long-term tax revenues would likely provide for increased infrastructure expenditures, it is suggested that EML and Eureka County build on previous and current planning efforts in order to prepare for the possible timing differences between expenditures and tax revenues. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	N/A	**Significance of the Impact**: This impact is considered significant. While the long-term tax revenues would likely provide for increased infrastructure expenditures, it is suggested that EML and Eureka County build on previous and current planning efforts in order to prepare for the possible timing differences between expenditures and tax revenues. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	**Significance of the Impact**: This impact is considered significant. While the long-term tax revenues would likely provide for increased infrastructure expenditures, it is suggested that EML and Eureka County build on previous and current planning efforts in order to prepare for the possible timing differences between expenditures and tax revenues. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.	**Significance of the Impact**: This impact is considered significant. While the long-term tax revenues would likely provide for increased infrastructure expenditures, it is suggested that EML and Eureka County build on previous and current planning efforts in order to prepare for the possible timing differences between expenditures and tax revenues. The implementation of mitigation measures for socioeconomic effects is beyond the jurisdiction of the BLM. See Section 3.26 of this EIS for a more detailed discussion of mitigation measures beyond the BLM's jurisdiction.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
			ENVIRONMENTAL JUSTICE		
Issue:	There are no Issues or Impacts with Regard to Environmental Justice				
			HAZARDOUS MATERIALS		
	Pages 3-584 through 3-584	**Pages 3-584 through 3-584**	**Pages 3-585 through 3-585**	**Pages 3-585 through 3-586**	**Pages 3-586 through 3-586**
Impact:	**Impact 3.19.3.3-1:** A spill of hazardous materials could adversely affect public safety and the environment.	**Impact 3.19.3.4-1:** A spill of hazardous materials could adversely affect public safety and the environment.	**Impact 3.19.3.5-1:** A spill of hazardous materials could adversely affect public safety and the environment.	**Impact 3.19.3.6-1:** A spill of hazardous materials could adversely affect public safety and the environment.	**Impact 3.19.3.7-1:** A spill of hazardous materials could adversely affect public safety and the environment.
Significance of the Impact:	**Significance of the Impact:** This impact is considered less than significant; however, the following mitigation measure is provided to reduce the adverse effects of this potential impact.	**Significance of the Impact:** This impact is considered less than significant, and no mitigation measures are proposed.	**Significance of the Impact:** This impact is considered less than significant: however, the following mitigation measure is provided to reduce the adverse effects of this potential impact.	**Significance of the Impact:** This impact is considered less than significant; however, the following mitigation measure is provided to reduce the adverse effects of this potential impact.	**Significance of the Impact:** This impact is considered less than significant; however, the following mitigation measure is provided to reduce the adverse effects of this potential impact.
Mitigation Measure:	**Mitigation Measure 3.19.3.3-1:** EML would maintain their existing Emergency Response Plan (EML 2006; Appendix 11).	N/A	**Mitigation Measure 3.19.3.5-1:** EML would maintain their existing Emergency Response Plan (EML 2006; Appendix 11).	**Mitigation Measure 3.19.3.6-1:** EML would maintain their existing Emergency Response Plan (EML 2006; Appendix 11).	**Mitigation Measure 3.19.3.7-1:** EML would maintain their existing Emergency Response Plan (EML 2006; Appendix 11).
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** The implementation of this mitigation measure would result in EML completing the necessary steps to understand how to respond to emergency situations with hazardous materials. This mitigation measure would be effective when an emergency condition develops because EML would have completed readiness preparation for	N/A	**Effectiveness of Mitigation and Residual Effects:** The implementation of this mitigation measure would result in EML completing the necessary steps to understand how to respond to emergency situations with hazardous materials. This mitigation measure would be effective when an emergency condition develops because EML would have completed readiness	**Effectiveness of Mitigation and Residual Effects:** The implementation of this mitigation measure would result in EML completing the necessary steps to understand how to respond to emergency situations with hazardous materials. This mitigation measure would be effective when an emergency condition develops because EML would have completed readiness	**Effectiveness of Mitigation and Residual Effects:** The implementation of this mitigation measure would result in EML completing the necessary steps to understand how to respond to emergency situations with hazardous materials. This mitigation measure would be effective when an emergency condition develops because EML would have completed readiness

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	responding to the emergency conditions.		preparation for responding to the emergency conditions.	preparation for responding to the emergency conditions.	preparation for responding to the emergency conditions.
			HISTORIC TRAILS		
	Pages 3-592 through 3-592		**Pages 3-594 through 3-594**	**Pages 3-595 through 3-595**	**Pages 3-596 through 3-597**
Impact:	**Impact 3.20.3.3-1:** The Proposed Action would permanently modify the viewshed from the historic trail within three miles of the centerline to a degree that is not consistent with the BLM VRM Class II threshold.	N/A	**Impact 3.20.3.5-1:** The Partial Backfill Alternative would permanently modify the viewshed from the historic trail within three miles of the centerline to a degree that is not consistent with the BLM VRM Class II threshold.	**Impact 3.20.3.6-1:** The Off-Site Transfer of Ore Concentrate for Processing Alternative would permanently modify the viewshed from the historic trail within three miles of the centerline to a degree that is not consistent with the BLM VRM Class II threshold.	**Impact 3.20.3.7-1:** The Slower, Longer Project Alternative would permanently modify the viewshed from the historic trail within three miles of the centerline to a degree that is not consistent with the BLM VRM Class II threshold.
Significance of the Impact:	**Significance of the Impact:** This potential impact to the historic trail is significant. The following mitigation has been identified for this impact.	N/A	**Significance of the Impact:** This potential impact to the historic trail is significant. The following mitigation has been identified for this impact.	**Significance of the Impact:** This potential impact to the historic trail is significant. The following mitigation has been identified for this impact.	**Significance of the Impact:** This potential impact to the historic trail is significant. The following mitigation has been identified for this impact.
Mitigation Measure:	**Mitigation Measure 3.20.3.3-1:** As part of the Historic Treatment Plan, mitigation for the historic trail would include photodocumentation to capture the setting and feel of the Pony Express Trail adjacent to the Project that would be visually impacted. The Treatment Plan would also include off-site mitigation in the form of GPS mapping and surveying of off-site portions of the Pony Express Trail located on public land. Segments would be selected at a one to one ratio of linear mileage based on the length of segments of the trail that would be impacted by the Project and are considered eligible as discussed in Section 3.21.3. Additionally, Mitigation Measure 3.7.3.3-1 would reduce visual impacts to users of the Pony Express Trail.	N/A	**Mitigation Measure 3.20.3.5-1:** As part of the Historic Treatment Plan, EML for the historic trail would include photodocumentation to capture the setting and feel of the Pony Express Trail adjacent to the Project that would be visually impacted. The Treatment Plan would also include off-site mitigation in the form of GPS mapping and surveying of off-site portions of the Pony Express Trail located on public land. Segments would be selected at a one to one ratio of linear mileage based on the length of segments of the trail that would be impacted by the Project and are considered eligible as discussed in Section 3.21.3. Additionally, Mitigation Measure 3.7.3.3-1 would reduce visual impacts to users of the Pony Express Trail.	**Mitigation Measure 3.20.3.6-1:** As part of the Historic Treatment Plan, mitigation for the historic trail would include photodocumentation to capture the setting and feel of the Pony Express Trail adjacent to the Project that would be visually impacted. The Treatment Plan would also include off-site mitigation in the form of GPS mapping and surveying of off-site portions of the Pony Express Trail located on public land. Segments would be selected at a one to one ratio of linear mileage based on the length of segments of the trail that would be impacted by the Project and are considered eligible as discussed in Section 3.21.3. Additionally, Mitigation Measure 3.7.3.3-1 would reduce visual impacts to users of the Pony Express Trail.	**Mitigation Measure 3.20.3.7-1:** As part of the Historic Treatment Plan, mitigation for the historic trail would include photodocumentation to capture the setting and feel of the Pony Express Trail adjacent to the Project that would be visually impacted. The Treatment Plan would also include off-site mitigation in the form of GPS mapping and surveying of off-site portions of the Pony Express Trail located on public land. Segments would be selected at a one to one ratio of linear mileage based on the length of segments of the trail that would be impacted by the Project and are considered eligible as discussed in Section 3.21.3. Additionally, Mitigation Measure 3.7.3.3-1 would reduce visual impacts to users of the Pony Express Trail.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** The effectiveness of this mitigation in reducing the impact to less than significant is not likely; however, given the type and scale of the action this mitigation would be the most effective approach at limiting the impact. The mitigation is designed to document the user experience of those segments of the trail that would be impacted by the Project and enhance the understanding of unevaluated segments of the trail. Therefore, these measures and the ones identified in Mitigation Measure 3.7.3.3-1 would be effective at mitigating visual impacts to the Pony Express Trail.	N/A	**Effectiveness of Mitigation and Residual Effects:** The effectiveness of this mitigation in reducing the impact to less than significant is not likely; however, given the type and scale of the action this mitigation would be the most effective approach at limiting the impact. The mitigation is designed to document the user experience of those segments of the trail that would be impacted by the Project and enhance the understanding of unevaluated segments of the trail. Therefore, these measures and the ones identified in Mitigation Measure 3.7.3.3-1 would be effective at mitigating visual impacts to the Pony Express Trail.	**Effectiveness of Mitigation and Residual Effects:** The effectiveness of this mitigation in reducing the impact to less than significant is not likely; however, given the type and scale of the action this mitigation would be the most effective approach at limiting the impact. The mitigation is designed to document the user experience of those segments of the trail that would be impacted by the Project and enhance the understanding of unevaluated segments of the trail. Therefore, these measures and the ones identified in Mitigation Measure 3.7.3.3-1 would be effective at mitigating visual impacts to the Pony Express Trail.	**Effectiveness of Mitigation and Residual Effects:** The effectiveness of this mitigation in reducing the impact to less than significant is not likely; however, given the type and scale of the action this mitigation would be the most effective approach at limiting the impact. The mitigation is designed to document the user experience of those segments of the trail that would be impacted by the Project and enhance the understanding of unevaluated segments of the trail. Therefore, these measures and the ones identified in Mitigation Measure 3.7.3.3-1 would be effective at mitigating visual impacts to the Pony Express Trail.
	Pages 3-592 through 3-593		**Pages 3-594 through 3-595**	**Pages 3-596 through 3-596**	**Pages 3-597 through 3-597**
Impact:	**Impact 3.20.3.3-2:** The Proposed Action would eliminate access to that portion of the historic trail within the Project exclusion fence.	N/A	**Impact 3.20.3.5-2:** The Partial Backfill Alternative would eliminate access to that portion of the historic trail within the Project exclusion fence.	**Impact 3.20.3.6-2:** The Off-Site Transfer of Ore Concentrate for Processing Alternative would eliminate access to that portion of the historic trail within the Project exclusion fence.	**Impact 3.20.3.7-2:** The Slower, Longer Project Alternative would eliminate access to that portion of the historic trail within the Project exclusion fence.
Significance of the Impact:	**Significance of the Impact:** This potential impact to the historic trail access is significant.	N/A	**Significance of the Impact:** This potential impact to the historic trail access is significant.	**Significance of the Impact:** This potential impact to the historic trail access is significant.	**Significance of the Impact:** This potential impact to the historic trail access is significant.
Mitigation Measure:	**Mitigation Measure 3.20.3.3-2:** EML would implement the mitigation plan included in Appendix D, Attachment 1 to provide access through the Project Area during the annual Pony Express re-ride, which generally occurs in June. This mitigation would allow for independent (non-NPEA) re-riders to follow the trail through the Project Area at other times of the year, subject to 30-day advance notice and certain safety restrictions, and subject to EML's approval, and to provide for an alternative route for trail riders during other times of the year, weather permitting.	N/A	**Mitigation Measure 3.20.3.5-2:** EML would implement the mitigation plan included in Appendix D, Attachment 1 to provide access through the Project Area during the annual Pony Express re-ride, which generally occurs in June. This mitigation would allow for independent (non-NPEA) re-riders to follow the trail through the Project Area at other times of the year, subject to 30-day advance notice and certain safety restrictions, and subject to EML's approval, and to provide for an alternative route for trail riders during other times of the year, weather permitting.	**Mitigation Measure 3.20.3.6-2:** EML would implement the mitigation plan included in Appendix D, Attachment 1 to provide access through the Project Area during the annual Pony Express re-ride, which generally occurs in June. This mitigation would allow for independent (non-NPEA) re-riders to follow the trail through the Project Area at other times of the year, subject to 30-day advance notice and certain safety restrictions, and subject to EML's approval, and to provide for an alternative route for trail riders during other times of the year, weather permitting.	**Mitigation Measure 3.20.3.7-2:** EML would implement the mitigation plan included in Appendix D, Attachment 1 to provide access through the Project Area during the annual Pony Express re-ride, which generally occurs in June. This mitigation would allow for independent (non-NPEA) re-riders to follow the trail through the Project Area at other times of the year, subject to 30-day advance notice and certain safety restrictions, and subject to EML's approval, and to provide for an alternative route for trail riders during other times of the year, weather permitting.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Implementation of this mitigation measure would effectively mitigate the impact for those times in June of each year when the re-ride occurs, as well as individual use at other times of the year. In addition, the mitigation would be effective by providing a continuous route, although not the designated route, year round. However, this mitigation has no effect on the closure of the designated route for most of the year.	N/A	**Effectiveness of Mitigation and Residual Effects:** Implementation of this mitigation measure would effectively mitigate the impact for those times in June of each year when the re-ride occurs, as well as individual use at other times of the year. In addition, the mitigation would be effective by providing a continuous route, although not the designated route, year round. However, this mitigation has no effect on the closure of the designated route for most of the year.	**Effectiveness of Mitigation and Residual Effects:** Implementation of this mitigation measure would effectively mitigate the impact for those times in June of each year when the re-ride occurs, as well as individual use at other times of the year. In addition, the mitigation would be effective by providing a continuous route, although not the designated route, year round. However, this mitigation has no effect on the closure of the designated route for most of the year.	**Effectiveness of Mitigation and Residual Effects:** Implementation of this mitigation measure would effectively mitigate the impact for those times in June of each year when the re-ride occurs, as well as individual use at other times of the year. In addition, the mitigation would be effective by providing a continuous route, although not the designated route, year round. However, this mitigation has no effect on the closure of the designated route for most of the year.
			CULTURAL RESOURCES		
	Pages 3-604 through 3-604		**Pages 3-606 through 3-606**	**Pages 3-607 through 3-608**	**Pages 3-609 through 3-609**
Impact:	**Impact 3.21.3.3-1:** Implementation of the Proposed Action would result in adverse effects to 83 officially eligible sites within the area of direct impacts. Outside of this area but within the Project APE, this action would also have indirect impacts on 180 officially	N/A	**Impact 3.21.3.5-1:** Implementation of the Partial Backfill Alternative would result in adverse effects to 83 officially eligible sites within the area of direct impacts. Outside of this area but within the Project APE, this action would also have	**Impact 3.21.3.6-1:** Implementation of the Off-Site Transfer of Ore Concentrate for Processing Alternative would result in adverse effects to 83 officially eligible sites within the area of direct impacts. Outside of this area but within the Project APE,	**Impact 3.21.3.7-1:** Implementation of the Slower, Longer Project Alternative would result in adverse effects to 83 officially eligible sites within the area of direct impacts. Outside of this area but within the Project APE, this action

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	eligible and one unevaluated site.		indirect impacts to 180 officially eligible and one unevaluated site.	this action would also have indirect impacts on 180 officially eligible and one unevaluated site.	would also have indirect impacts on 180 officially eligible and one unevaluated site.
Significance of the Impact:	**Significance of the Impact:** These direct impacts are considered to be significant. However, indirect impacts to eligible and unevaluated cultural resources within the Project APE are not considered to be significant at this time.	N/A	**Significance of the Impact:** These direct impacts are considered to be significant. However, indirect impacts to eligible and unevaluated cultural resources within the Project APE are not considered to be significant at this time.	**Significance of the Impact:** These impacts are considered to be significant. However, indirect impacts to eligible and unevaluated cultural resources within the Project APE are not considered to be significant at this time.	**Significance of the Impact:** These impacts are considered to be significant. However, indirect impacts to eligible and unevaluated cultural resources within the Project APE are not considered to be significant at this time.
Mitigation Measure:	**Mitigation Measure 3.21.3.3-1:** EML would develop, and submit to the BLM for approval, a treatment plan to address the potential direct impacts to the 83 officially eligible sites within the Project APE. EML would implement the treatment plan prior to any surface disturbance of eligible sites within the area of direct impacts. All adverse effects under the NHPA and direct and indirect impacts under the NEPA to known-eligible properties indentified within the Project APE would be mitigated in accordance with the PA and the treatment plan prepared for the Project. Any previously unknown-eligible properties that may be discovered during construction activities would be mitigated in accordance with the PA. No residual adverse effects are anticipated, as all known-eligible sites would be mitigated in accordance with the PA and the treatment plan prepared for the Project. Any previously unknown-eligible properties that may be discovered during construction activities would be mitigated in accordance with the PA.	N/A	**Mitigation Measure 3.21.3.5-1:** EML would develop, and submit to the BLM for approval, a treatment plan to address the potential impacts to the 83 officially eligible sites within the Project APE. EML would implement the treatment plan prior to any surface disturbance of eligible sites within the area of direct impacts. All adverse effects under the NHPA and direct and indirect impacts under NEPA to known-eligible properties identified within the Project APE would be mitigated in accordance with the PA and the treatment plan prepared for the Project. Any previously unknown-eligible properties that may be discovered during construction activities would be mitigated in accordance with the PA. No residual adverse effects are anticipated, as all known-eligible sites would be mitigated in accordance with the PA and the treatment plan prepared for the Project.	**Mitigation Measure 3.21.3.6-1:** EML would develop, and submit to the BLM for approval, a treatment plan to address the potential impacts to the 83 officially eligible sites within the Project APE. EML would implement the treatment plan prior to any surface disturbance of eligible sites within the area of direct impacts. This mitigation would be effective at reducing the impacts to cultural resources. All adverse effects under the NHPA and direct and indirect impacts under NEPA to known-eligible properties identified within the Project APE would be mitigated in accordance with the PA and the treatment plan prepared for the Project. Any previously unknown-eligible properties that may be discovered during construction activities would be mitigated in accordance with the PA. No residual adverse effects are anticipated, as all known-eligible sites would be mitigated in accordance with the PA and the treatment plan prepared for the Project.	**Mitigation Measure 3.21.3.7-1:** EML would develop, and submit to the BLM for approval, a treatment plan to address the potential impacts to the 83 officially eligible sites within the Project APE. EML would implement the treatment plan prior to any surface disturbance of eligible sites within the area of direct impacts. This mitigation would be effective at reducing the impacts to cultural resources. All adverse effects under the NHPA and direct and indirect impacts under NEPA to known-eligible properties identified within the Project APE would be mitigated in accordance with the PA and the treatment plan prepared for the Project. Any previously unknown-eligible properties that may be discovered during construction activities would be mitigated in accordance with the PA. No residual adverse effects are anticipated, as all known-eligible sites would be mitigated in accordance with the PA and the treatment plan prepared for the Project.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** The implementation of the treatment plan under the mitigation measure would be effective at lessening the impact.	N/A	**Effectiveness of Mitigation and Residual Effects:** The implementation of the treatment plan under the mitigation measure would be effective at lessening the impact.	**Effectiveness of Mitigation and Residual Effects:** The implementation of the treatment plan under the mitigation measure would be effective at lessening the impact.	**Effectiveness of Mitigation and Residual Effects:** The implementation of the treatment plan under the mitigation measure would be effective at lessening the impact.
	Pages 3-604 through 3-605		**Pages 3-606 through 3-607**	**Pages 3-608 through 3-608**	**Pages 3-609 through 3-610**
Impact:	**Impact 3.21.3.3-2:** Within the viewshed APE, 436 eligible and unevaluated historic and multi-component sites with a historic component would be indirectly impacted by reducing each site's integrity of setting as a result of the Proposed Action.	N/A	**Impact 3.21.3.5-2:** Within the viewshed APE, 436 eligible and unevaluated historic and multi-component sites with a historic component would be indirectly impacted by reducing each site's integrity of setting as a result of the Proposed Action.	**Impact 3.21.3.6-2:** Within the viewshed APE, 436 eligible and unevaluated historic and multi-component sites with a historic component would be indirectly impacted by reducing each site's integrity of setting as a result of the Proposed Action.	**Impact 3.21.3.7-2:** Within the viewshed APE, 436 eligible and unevaluated historic and multi-component sites with a historic component would be indirectly impacted by reducing each site's integrity of setting as a result of the Proposed Action.
Significance of the Impact:	**Significance of the Impact:** Within the viewshed APE, eligible and unevaluated cultural resources would be indirectly affected by the Project and have also been previously impacted by past and present actions. The indirect impacts to eligible and unevaluated cultural resources within the viewshed APE (outside the project area) are not considered to be significant at this time.	N/A	**Significance of the Impact:** Within the viewshed APE, eligible and unevaluated cultural resources would be indirectly affected by the Project and have been previously impacted by past and present actions. The indirect impacts to eligible and unevaluated cultural resources within the viewshed APE (outside the project area) are not considered to be significant at this time.	**Significance of the Impact:** Within the viewshed APE, eligible and unevaluated cultural resources would be indirectly affected by the Project and have been previously impacted by past and present actions. The indirect impacts to eligible and unevaluated cultural resources within the viewshed APE (outside the project area) are not considered to be significant at this time.	**Significance of the Impact:** Within the viewshed APE, eligible and unevaluated cultural resources would be indirectly affected by the Project and have been previously impacted by past and present actions. The indirect impacts to eligible and unevaluated cultural resources within the viewshed APE (outside the project area) are not considered to be significant at this time.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Pages 3-605 through 3-605		**Pages 3-607 through 3-607**	**Pages 3-608 through 3-609**	**Pages 3-610 through 3-610**
Impact:	**Impact 3.21.3.3-3:** As a result of the Proposed Action, there could be an impact to Native American remains or artifacts.	N/A	**Impact 3.21.3.5-3:** As a result of the Proposed Action, there could be an impact to Native American remains or artifacts.	**Impact 3.21.3.6-3:** As a result of the Proposed Action, there could be an impact to Native American remains or artifacts.	**Impact 3.21.3.7-3:** As a result of the Proposed Action, there could be an impact to Native American remains or artifacts.
Significance of the Impact:	**Significance of the Impact:** This impact would be considered potentially significant; however, the impact would become less than significant after implementation of the mitigation measure described below.	N/A	**Significance of the Impact:** This impact would be considered potentially significant; however, the impact would become less than significant after implementation of the mitigation measure described below.	**Significance of the Impact:** This impact would be considered potentially significant; however, the impact would become less than significant after implementation of the mitigation measure described below.	**Significance of the Impact:** This impact would be considered potentially significant; however, the impact would become less than significant after implementation of the mitigation measure described below.
Mitigation Measure:	**Mitigation Measure 3.21.3.3-3:** In the case of inadvertent discovery of human remains, the BMDO Policy for the Discovery of Human Remains (IM NV-2010-001) – notification procedures - would be followed. If the remains are determined to be native, NAGPRA inadvertent discovery procedures would be adhered to. Under the NAGPRA, section (3)(d)(1), it states that the discovering individual must notify the land manager in writing of such a discovery. If the discovery occurs in connection with an authorized use, the activity, which caused the discovery, is to cease and the materials are to be protected until the land manager can respond to the situation. Tribes, tribal organizations, possible lineal descendants, and individuals would then be contacted to determine cultural affiliation and subsequent transfer of custody procedures would begin.	N/A	**Mitigation Measure 3.21.3.5-3:** In the case of inadvertent discovery of human remains, the BMDO Policy for the Discovery of Human Remains (IM NV-2010-001) – notification procedures - would be followed. If the remains are determined to be native, NAGPRA inadvertent discovery procedures would be adhered to. Under the NAGPRA, section (3)(d)(1), it states that the discovering individual must notify the land manager in writing of such a discovery. If the discovery occurs in connection with an authorized use, the activity, which caused the discovery, is to cease and the materials are to be protected until the land manager can respond to the situation. Tribes, tribal organizations, possible lineal descendants, and individuals would then be contacted to determine cultural affiliation and subsequent transfer of custody procedures would begin.	**Mitigation Measure 3.21.3.6-3:** In the case of inadvertent discovery of human remains, the BMDO Policy for the Discovery of Human Remains (IM NV-2010-001) – notification procedures - would be followed. If the remains are determined to be native, NAGPRA inadvertent discovery procedures would be adhered to. Under the NAGPRA, section (3)(d)(1), it states that the discovering individual must notify the land manager in writing of such a discovery. If the discovery occurs in connection with an authorized use, the activity, which caused the discovery, is to cease and the materials are to be protected until the land manager can respond to the situation. Tribes, tribal organizations, possible lineal descendants, and individuals would then be contacted to determine cultural affiliation and subsequent transfer of custody procedures would begin.	**Mitigation Measure 3.21.3.7-3:** In the case of inadvertent discovery of human remains, the BMDO Policy for the Discovery of Human Remains (IM NV-2010-001) – notification procedures - would be followed. If the remains are determined to be native, NAGPRA inadvertent discovery procedures would be adhered to. Under the NAGPRA, section (3)(d)(1), it states that the discovering individual must notify the land manager in writing of such a discovery. If the discovery occurs in connection with an authorized use, the activity, which caused the discovery, is to cease and the materials are to be protected until the land manager can respond to the situation. Tribes, tribal organizations, possible lineal descendants, and individuals would then be contacted to determine cultural affiliation and subsequent transfer of custody procedures would begin.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** The Project could result in the exposure of Native American remains or artifacts. Implementation of Mitigation Measure 3.21.3.3-3 would prevent any impacts to these discoveries.	N/A	**Effectiveness of Mitigation and Residual Effects:** The Project could result in the exposure of Native American remains or artifacts. Implementation of Mitigation Measure 3.21.3.5-3 would prevent any impacts to these discoveries.	**Effectiveness of Mitigation and Residual Effects:** The Project could result in the exposure of Native American remains or artifacts. Implementation of Mitigation Measure 3.21.3.6-3 would prevent any impacts to these discoveries.	**Effectiveness of Mitigation and Residual Effects:** The Project could result in the exposure of Native American remains or artifacts. Implementation of Mitigation Measure 3.21.3.7-3 would prevent any impacts to these discoveries.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
NATIVE AMERICAN TRADITIONAL VALUES					
	Pages 3-617 through 3-617	**Pages 3-620 through 3-620**	**Pages 3-620 through 3-621**	**Pages 3-623 through 3-624**	**Pages 3-626 through 3-627**
Impact:	**Impact 3.22.3.3-1:** As a result of the Proposed Action, there could be an impact to Native American remains or artifacts.	**Impact 3.22.3.4-1:** The No Action Alternative Action would remove a small and undetermined number of acres of piñon-juniper habitat, which would then not be available for pine nut gathering.	**Impact 3.22.3.5-1:** As a result of the Partial Backfill Alternative, there could be an impact to Native American remains or artifacts.	**Impact 3.22.3.6-1:** As a result of the Off-Site Transfer of Ore Concentrate for Processing Alternative, there could be an impact to Native American remains or artifacts.	**Impact 3.22.3.7-1:** As a result of the Slower, Longer Project Alternative, there could be an impact to Native American remains or artifacts.
Significance of the Impact:	**Significance of the Impact:** This impact would be considered potentially significant; however, the impact would become less than significant after implementation of the mitigation measure described below.	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.22.3.1; therefore, no mitigation measures are proposed.	**Significance of the Impact:** This impact would be considered potentially significant; however, the impact would become less than significant after implementation of the mitigation measure described below.	**Significance of the Impact:** This impact would be considered potentially significant; however, the impact would become less than significant after implementation of the mitigation measure described below.	**Significance of the Impact:** This impact would be considered potentially significant; however, the impact would become less than significant after implementation of the mitigation measure described below.
Mitigation Measure:	**Mitigation Measure 3.22.3.3-1:** In the case of inadvertent discovery of human remains, the BMDO Policy for the Discovery of Human Remains (IM NV-2010-001) – notification procedures - would be followed. If the remains are determined to be native, NAGPRA inadvertent discovery procedures would be adhered to. Under the NAGPRA, section (3)(d)(1), it states that the discovering individual must notify the land manager in writing of such a discovery. If the discovery occurs in connection with an authorized use, the activity, which caused the discovery, is to cease and the materials are to be protected until the land manager can respond to the situation. Tribes, tribal organizations, possible lineal descendants, and individuals would then be contacted to determine cultural affiliation and subsequent transfer of custody procedures would begin.	N/A	**Mitigation Measure 3.22.3.5-1:** In the case of inadvertent discovery of human remains, the BMDO Policy for the Discovery of Human Remains (IM NV-2010-001) – notification procedures - would be followed. If the remains are determined to be native, NAGPRA inadvertent discovery procedures would be adhered to. Under the NAGPRA, section (3)(d)(1), it states that the discovering individual must notify the land manager in writing of such a discovery. If the discovery occurs in connection with an authorized use, the activity, which caused the discovery, is to cease and the materials are to be protected until the land manager can respond to the situation. Tribes, tribal organizations, possible lineal descendants, and individuals would then be contacted to determine cultural affiliation and subsequent transfer of custody procedures would begin.	**Mitigation Measure 3.22.3.6-1:** In the case of inadvertent discovery of human remains, the BMDO Policy for the Discovery of Human Remains (IM NV-2010-001) – notification procedures - would be followed. If the remains are determined to be native, NAGPRA inadvertent discovery procedures would be adhered to. Under the NAGPRA, section (3)(d)(1), it states that the discovering individual must notify the land manager in writing of such a discovery. If the discovery occurs in connection with an authorized use, the activity, which caused the discovery, is to cease and the materials are to be protected until the land manager can respond to the situation. Tribes, tribal organizations, possible lineal descendants, and individuals would then be contacted to determine cultural affiliation and subsequent transfer of custody procedures would begin.	**Mitigation Measure 3.22.3.7-1:** In the case of inadvertent discovery of human remains, the BMDO Policy for the Discovery of Human Remains (IM NV-2010-001) – notification procedures - would be followed. If the remains are determined to be native, NAGPRA inadvertent discovery procedures would be adhered to. Under the NAGPRA, section (3)(d)(1), it states that the discovering individual must notify the land manager in writing of such a discovery. If the discovery occurs in connection with an authorized use, the activity, which caused the discovery, is to cease and the materials are to be protected until the land manager can respond to the situation. Tribes, tribal organizations, possible lineal descendants, and individuals would then be contacted to determine cultural affiliation and subsequent transfer of custody procedures would begin.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** The Project could result in the exposure of Native American remains or artifacts. Implementation of Mitigation Measure 3.22.3.3-1 would prevent any impacts to these discoveries.	N/A	**Effectiveness of Mitigation and Residual Effects:** The Project could result in the exposure of Native American remains or artifacts. Implementation of Mitigation Measure 3.22.3.5-1 would prevent any impacts to these discoveries.	**Effectiveness of Mitigation and Residual Effects:** The Project could result in the exposure of Native American remains or artifacts. Implementation of Mitigation Measure 3.22.3.6-1 would prevent any impacts to these discoveries.	**Effectiveness of Mitigation and Residual Effects:** The Project could result in the exposure of Native American remains or artifacts. Implementation of Mitigation Measure 3.22.3.7-1 would prevent any impacts to these discoveries.
	Pages 3-618 through 3-618		**Pages 3-621 through 3-621**	**Pages 3-624 through 3-624**	**Pages 3-627 through 3-627**
Impact:	**Impact 3.22.3.3-2:** The Proposed Action would remove 3,296 acres of piñon-juniper habitat, which includes piñon trees that would then not be available for pine nut gathering.	N/A	**Impact 3.22.3.5-2:** The Partial Backfill Alternative would remove 3,296 acres of piñon-juniper habitat, which would then not be available for pine nut gathering.	**Impact 3.22.3.6-2:** The Off-Site Transfer of Ore Concentrate for Processing Alternative would remove 3,296 acres of piñon-juniper habitat, which would then not be available for pine nut gathering.	**Impact 3.22.3.7-2:** The Slower, Longer Project Alternative would remove 3,296 acres of piñon-juniper habitat, which would then not be available for pine nut gathering.
Significance of the Impact:	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.22.3.1 since there are no identified avoidance areas. No mitigation is proposed.	N/A	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.22.3.1 since there are no identified avoidance areas. No mitigation is proposed.	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.22.3.1 since there are no identified avoidance areas. No mitigation is proposed.	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.22.3.1 since there are no identified avoidance areas. No mitigation is proposed.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Pages 3-618 through 3-618		**Pages 3-621 through 3-622**	**Pages 3-624 through 3-625**	**Pages 3-627 through 3-628**
Impact:	**Impact 3.22.3.3-3:** The Proposed Action would restrict 4,600 acres of piñon-juniper habitat within the Project boundary fence, which would then not be available for pine nut gathering for the duration of the Project.	N/A	**Impact 3.22.3.5-3:** The Partial Backfill Project Alternative would restrict 4,600 acres of piñon-juniper habitat within the Project boundary fence, which would then not be available for pine nut gathering for the duration of the Project.	**Impact 3.22.3.6-3:** The Off-Site Transfer of Ore Concentrate for Processing Alternative would restrict 4,600 acres of piñon-juniper habitat within the Project boundary fence, which would then not be available for pine nut gathering for the duration of the Project.	**Impact 3.22.3.7-3:** The Slower, Longer Project Alternative would restrict 4,600 acres of piñon-juniper habitat within the Project boundary fence, which would then not be available for pine nut gathering for the duration of the Project.
Significance of the Impact:	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.22.3.1 since there are no identified avoidance areas. However, the following mitigation measure is proposed.	N/A	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.22.3.1 since there are no identified avoidance areas. However, the following mitigation measure is proposed.	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.22.3.1 since there are no identified avoidance areas. However, the following mitigation measure is proposed.	**Significance of the Impact:** The impact does not meet the significance criteria listed in Section 3.22.3.1 since there are no identified avoidance areas. However, the following mitigation measure is proposed.
Mitigation Measure:	**Mitigation Measure 3.22.3.3-3:** In years of greater than average cone production, as determined by the BLM and requested by the tribes, EML would make areas within the Project Area fence available for Native American pine nut gathering, subject to all applicable MSHA requirements.		**Mitigation Measure 3.22.3.5-3:** In years of greater than average cone production, as determined by the BLM and requested by the tribes, EML would make areas within the Project Area fence available for Native American pine nut gathering, subject to all applicable MSHA requirements.	**Mitigation Measure 3.22.3.6-3:** In years of greater than average cone production, as determined by the BLM and requested by the tribes, EML would make areas within the Project Area fence available for Native American pine nut gathering, subject to all applicable MSHA requirements.	**Mitigation Measure 3.22.3.7-3:** In years of greater than average cone production, as determined by the BLM and requested by the tribes, EML would make areas within the Project Area fence available for Native American pine nut gathering, subject to all applicable MSHA requirements.
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	Pages 3-619 through 3-619		**Pages 3-622 through 3-622**	**Pages 3-625 through 3-625**	**Pages 3-628 through 3-628**
Impact:	**Impact 3.22.3.3-4:** The Proposed Action could impact 22 springs, 7.7 miles of perennial streams (Roberts Creek and Henderson Creek), and 61.4 acres of riparian areas associated with these creeks, which are, in a general nature, considered sacred by Native Americans.	N/A	**Impact 3.22.3.5-4:** The Partial Backfill Alternative could impact 22 springs, 7.7 miles of perennial streams (Roberts Creek and Henderson Creek), and 61.4 acres of riparian areas associated with these creeks, which are, in a general nature, considered sacred by Native Americans.	**Impact 3.22.3.6-4:** The Off-Site Transfer of Ore Concentrate for Processing Alternative could impact 22 springs, 7.7 miles of perennial streams (Roberts Creek and Henderson Creek), and 61.4 acres of riparian areas associated with these creeks, which are, in a general nature, considered sacred by Native Americans.	**Impact 3.22.3.7-4:** The Slower, Longer Project Alternative could impact 29 springs, 7.7 miles of perennial streams (Roberts Creek and Henderson Creek), and 61.4 acres of riparian areas associated with these creeks, which are, in a general nature, considered sacred by Native Americans.
Significance of the Impact:	**Significance of the Impact:** Even though water has been identified through Native American Consultation by the BLM as an important issue to the Western Shoshone, none of the springs or perennial streams that could potentially be impacted by the Proposed Action have been specifically identified as traditional or religious use areas. Therefore, the Proposed Action impact does not meet the significance criteria listed in Section 3.22.3.1, and no resource specific mitigation measures were determined necessary. Mitigation for impacts to water resources have been identified in Section 3.2.3.3, which would have the potential of reducing some of the impacts.	N/A	**Significance of the Impact:** Even though water has been identified through Native American Consultation by the BLM as an important issue to the Western Shoshone, none of the springs or perennial streams that could potentially be impacted by the Proposed Action have been specifically identified as traditional or religious use areas. Therefore, the Partial Backfill Alternative impact does not meet the significance criteria listed in Section 3.22.3.1, and no resource specific mitigation measures were proposed. Mitigation for impacts to water resources have been identified in Section 3.2.3.5, which would have the potential of reducing some of the impacts.	**Significance of the Impact:** Even though water has been identified through Native American Consultation by the BLM as an important issue to the Western Shoshone, none of the springs or perennial streams that could potentially be impacted by the Proposed Action have been specifically identified as traditional or religious use areas. Therefore, the Off-Site Transfer of Ore Concentrate for Processing Alternative impact does not meet the significance criteria listed in Section 3.22.3.1, and no resource specific mitigation measures were determined necessary. Mitigation for impacts to water resources have been identified in Section 3.2.3.6, which would have the potential of reducing some of the impacts.	**Significance of the Impact:** Even though water has been identified through Native American Consultation by the BLM as an important issue to the Western Shoshone, none of the springs or perennial streams that could potentially be impacted by the Proposed Action have been specifically identified as traditional or religious use areas. Therefore, the Slower, Longer Project Alternative impact does not meet the significance criteria listed in Section 3.22.3.1, and no resource specific mitigation measures were determined necessary. Mitigation for impacts to water resources have been identified in Section 3.2.3.5, which would have the potential of reducing some of the impacts.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Pages 3-619 through 3-619		**Pages 3-623 through 3-623**	**Pages 3-626 through 3-626**	**Pages 3-629 through 3-629**
Impact:	**Impact 3.22.3.3-5:** The Proposed Action could impact 100 prehistoric cultural sites by removing them from the landscape.	N/A	**Impact 3.22.3.5-5:** The Partial Backfill Alternative could impact 100 prehistoric cultural sites by removing them from the landscape.	**Impact 3.22.3.6-5:** The Off-Site Transfer of Ore Concentrate for Processing Alternative could impact 100 prehistoric cultural sites by removing them from the landscape.	**Impact 3.22.3.7-5:** The Slower, Longer Project Alternative could impact 100 prehistoric cultural sites by removing them from the landscape.
Significance of the Impact:	**Significance of the Impact:** The removal of any sites from the landscape is considered significant by the Native Americans. Therefore this impact is significant. As outlined in Section 3.21, those sites that are eligible for the NRHP would be treated prior to Project activities; however, this does not reduce the impact to Native Americans. Although prehistoric and ethnohistoric sites and associated artifacts exist within the general area of the proposed expansion, no Native American traditional use sites, activities, or associated resources are known to exist in proposed disturbance areas. Therefore, no mitigation measures specific to contemporary tribal uses are proposed. However, for those archaeological sites (prehistoric and historic) scheduled or proposed for treatment (i.e., data recovery/excavation), tribal participants would be given the opportunity to monitor the data recovery efforts, and provide interpretation of any artifacts or features discovered during the process. In addition, the BLM or a contracted Cultural Resources Specialist/Archaeologist, accompanied by designated tribal representatives and/or descendants, may conduct periodical or stipulated monitoring of sites scheduled for avoidance before, during, and after Project construction. Monitoring of identified archaeological sites within and in close proximity to proposed disturbance areas could occur throughout the life of the Project to ensure agreed upon avoidance.	N/A	**Significance of the Impact:** The removal of any sites from the landscape is considered significant by the Native Americans. Therefore this impact is significant. As outlined in Section 3.21, those sites that are eligible for the NRHP would be treated prior to Project activities; however, this does not reduce the impact to Native Americans. Although prehistoric and ethnohistoric sites and associated artifacts exist within the general area of the proposed expansion, no Native American traditional use sites, activities, or associated resources are known to exist in proposed disturbance areas. Therefore, no mitigation measures specific to contemporary tribal uses are proposed. However, for those archaeological sites (prehistoric and historic) scheduled or proposed for treatment (i.e., data recovery/excavation), tribal participants would be given the opportunity to monitor the data recovery efforts, and provide interpretation of any artifacts or features discovered during the process. In addition, the BLM or a contracted Cultural Resources Specialist/Archaeologist, accompanied by designated tribal representatives and/or descendants, may conduct periodical or stipulated monitoring of sites scheduled for avoidance before, during, and after Project construction. Monitoring of identified archaeological sites within and in close proximity to proposed disturbance areas could occur throughout the life of the Project to ensure agreed upon avoidance.	**Significance of the Impact:** The removal of any sites from the landscape is considered significant by the Native Americans. Therefore this impact is significant. As outlined in Section 3.21, those sites that are eligible for the NRHP would be treated prior to Project activities; however, this does not reduce the impact to Native Americans. Although prehistoric and ethnohistoric sites and associated artifacts exist within the general area of the proposed expansion, no Native American traditional use sites, activities, or associated resources are known to exist in proposed disturbance areas. Therefore, no mitigation measures specific to contemporary tribal uses is proposed. However, for those archaeological sites (prehistoric and historic) scheduled or proposed for treatment (i.e., data recovery/excavation), tribal participants would be given the opportunity to monitor the data recovery efforts, and provide interpretation of any artifacts or features discovered during the process. In addition, the BLM or a contracted Cultural Resources Specialist/Archaeologist, accompanied by designated tribal representatives and/or descendants, may conduct periodical or stipulated monitoring of sites scheduled for avoidance before, during, and after project construction. Monitoring of identified archaeological sites within and in close proximity to proposed disturbance areas could occur throughout the life of the project to ensure agreed upon avoidance.	**Significance of the Impact:** The removal of any sites from the landscape is considered significant by the Native Americans. Therefore this impact is significant. As outlined in Section 3.21, those sites that are eligible for the NRHP would be treated prior to Project activities; however, this does not reduce the impact to Native Americans. Although prehistoric and ethnohistoric sites and associated artifacts exist within the general area of the proposed expansion, no Native American traditional use sites, activities, or associated resources are known to exist in proposed disturbance areas. Therefore, no mitigation measures specific to contemporary tribal uses is proposed. However, for those archaeological sites (prehistoric and historic) scheduled or proposed for treatment (i.e., data recovery/excavation), tribal participants would be given the opportunity to monitor the data recovery efforts, and provide interpretation of any artifacts or features discovered during the process. In addition, the BLM or a contracted Cultural Resources Specialist/Archaeologist, accompanied by designated tribal representatives and/or descendants, may conduct periodical or stipulated monitoring of sites scheduled for avoidance before, during, and after Project construction. Monitoring of identified archaeological sites within and in close proximity to proposed disturbance areas could occur throughout the life of the Project to ensure agreed upon avoidance.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
WILDLIFE AND FISHERIES RESOURCES					
	Pages 3-660 through 3-660		**Pages 3-670 through 3-670**	**Pages 3-674 through 3-674**	**Pages 3-679 through 3-679**
Impact:	**Impact 3.23.3.3-1:** Approximately 8,355 acres of wildlife habitat would be directly removed as a result of the Proposed Action over the 44-year mine life.	N/A	**Impact 3.23.3.5-1:** Approximately 8,355 acres of wildlife habitat would be directly removed as a result of the Proposed Action over the 44-year mine life.	**Impact 3.23.3.6-1:** Approximately 8,355 acres of wildlife habitat would be directly removed as a result of the Proposed Action over the 44-year mine life.	**Impact 3.23.3.7-1:** Approximately 8,355 acres of wildlife habitat would be directly removed as a result of the Slower, Longer Project Alternative over the extended mine life.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	N/A	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Pages 3-661 through 3-661		**Pages 3-670 through 3-670**	**Pages 3-675 through 3-675**	**Pages 3-679 through 3-679**
Impact:	**Impact 3.23.3.3-2:** Modification of wildlife habitat and subsequent reclamation efforts would result in less available mature vegetation for cover, forage, and nesting habitat for many species of wildlife in the short term.	N/A	**Impact 3.23.3.5-2:** Modification of wildlife habitat and subsequent reclamation efforts would result in less available mature vegetation for cover, forage, and nesting habitat for many species of wildlife in the short term.	**Impact 3.23.3.6-2:** Modification of wildlife habitat and subsequent reclamation efforts would result in less available mature vegetation for cover, forage, and nesting habitat for many species of wildlife in the short term.	**Impact 3.23.3.7-2:** Modification of wildlife habitat and subsequent reclamation efforts would result in less available mature vegetation for cover, forage, and nesting habitat for many species of wildlife for the duration of this alternative.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	N/A	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Pages 3-661 through 3-661		**Pages 3-670 through 3-670**	**Pages 3-675 through 3-675**	**Pages 3-679 through 3-679**
Impact:	**Impact 3.23.3.3-3:** Loud and sudden noises associated with the Proposed Action could result in wildlife displacement for the life of the Project.	N/A	**Impact 3.23.3.5-3:** Loud and sudden noises associated with the Partial Backfill Alternative could result in wildlife displacement for the life of the Project.	**Impact 3.23.3.6-3:** Loud and sudden noises associated with the Proposed Action could result in wildlife displacement for the life of the Project.	**Impact 3.23.3.7-3:** Loud and sudden noises associated with the Slower, Longer Project Alternative could result in wildlife displacement for the life of the Project.
Significance of the Impact:	**Significance of the Impact:** The proposed Project may produce an increase greater than 10 dB above ambient noise levels, which can be detrimental to lekking greater sage-grouse. Therefore, the impact is considered significant and the following mitigation measure has been identified	N/A	**Significance of the Impact:** The proposed Project may produce an increase greater than 10 dB above ambient noise levels, which can be detrimental to lekking greater sage-grouse. Therefore, the impact is considered significant and the following mitigation measure has been identified.	**Significance of the Impact:** The proposed Project may produce an increase greater than 10 dB above ambient noise levels, which can be detrimental to lekking greater sage-grouse. Therefore, the impact is considered significant and the following mitigation measure has been identified.	**Significance of the Impact:** The proposed Project may produce an increase greater than 10 dB above ambient noise levels, which can be detrimental to lekking greater sage-grouse. Therefore, the impact is considered significant and the following mitigation measure has been identified.
Mitigation Measure:	**Mitigation Measure 3.23.3.3-3:** Mitigation for noise impacts is included in Mitigation Measure 3.23.3.3-6 (as identified in the Sage Grouse Conservation Measures in Appendix D, Attachment 3) and includes noise reducing enclosures that would be installed on the Project's booster stations in Kobeh Valley as well as possible modification to the pumping regime during lekking season.	N/A	**Mitigation Measure 3.23.3.5-3:** Mitigation for noise impacts is included in Mitigation Measure 3.23.3.3-6 (as identified in the Sage Grouse Conservation Measures in Appendix D, Attachment 3) and includes noise reducing enclosures that would be installed on the Project's booster stations in Kobeh Valley as well as possible modification to the pumping regime during lekking season.	**Mitigation Measure 3.23.3.6-3:** Mitigation for noise impacts is included in Mitigation Measure 3.23.3.3-6 (as identified in the Sage Grouse Conservation Measures in Appendix D, Attachment 3) and includes noise reducing enclosures that would be installed on the Project's booster stations in Kobeh Valley as well as possible modification to the pumping regime during lekking season.	**Mitigation Measure 3.23.3.7-3:** Mitigation for noise impacts is included in Mitigation Measure 3.23.3.3-6 (as identified in the Sage Grouse Conservation Measures in Appendix D, Attachment 3) and includes noise reducing enclosures that would be installed on the Project's booster stations in Kobeh Valley as well as possible modification to the pumping regime during lekking season.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.23.3.3-3 would be effective to reduce any impacts from noise to greater sage-grouse to less than significant.	N/A	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.23.3.5-3 would be effective to reduce any impacts from noise to greater sage-grouse to less than significant.	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.23.3.6-3 would be effective to reduce any impacts from noise to greater sage-grouse to less than significant.	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.23.3.7-3 would be effective to reduce any impacts from noise to greater sage-grouse to less than significant.
	Pages 3-662 through 3-663		**Pages 3-670 through 3-671**	**Pages 3-675 through 3-676**	**Pages 3-679 through 3-680**
Impact:	**Impact 3.23.3.3-4:** Wildlife dependent on vegetation growing near perennial streams, springs, and seeps would potentially experience water stress due to the water table drawdown associated with mine dewatering and subsequent filling of the open pit. Lowering of the water table in the area of these plants would potentially cause a decline in the wetland vegetation community and the associated wildlife species. The lowering of the water table would also potentially result in less water for wildlife consumption.	N/A	**Impact 3.23.3.5-4:** Wildlife dependent on vegetation growing near perennial streams, springs, and seeps would potentially experience water stress due to the water table drawdown associated with mine dewatering and subsequent filling of the open pit. Lowering of the water table in the area of these plants would potentially cause a decline in the wetland vegetation community and the associated wildlife species. The lowering of the water table would also potentially result in less water for wildlife consumption.	**Impact 3.23.3.6-4:** Wildlife dependent on vegetation growing near perennial streams, springs, and seeps would potentially experience water stress due to the water table drawdown associated with mine dewatering and subsequent filling of the open pit. Lowering of the water table in the area of these plants would potentially cause a decline in the wetland vegetation community and the associated wildlife species. The lowering of the water table would also potentially result in less water for wildlife consumption.	**Impact 3.23.3.7-4:** Wildlife dependent on vegetation growing near perennial streams, springs, and seeps would potentially experience water stress due to the water table drawdown associated with mine dewatering and subsequent filling of the open pit. Lowering of the water table in the area of these plants would potentially cause a decline in the wetland vegetation community and the associated wildlife species. The lowering of the water table would also potentially result in less water for wildlife consumption.
Significance of the Impact:	**Significance of the Impact:** The impact could be significant. The BLM has identified the following mitigation that would benefit wildlife.	N/A	**Significance of the Impact:** The impact could be significant. The BLM has identified the following mitigation that would benefit wildlife.	**Significance of the Impact:** The impact would not be significant; however, the BLM has identified the following mitigation that would benefit wildlife.	**Significance of the Impact:** The impact would not be significant; however, the BLM has identified the following mitigation that would benefit wildlife.
Mitigation Measure:	**Mitigation Measure 3.23.3.3-4:** Mitigation for the potential loss of water would include the development of six water sites (Figure 3.13.1) that were identified for wild horses and two additional sites that would be designed specifically for wildlife use. Although the sites shown on Figure 3.13.1 were identified as part of mitigation for wild horses (Section 3.13), development of the sites could also result in indirect beneficial impacts to wildlife species throughout the Project Area. The locations and design of the wildlife-specific water developments would be determined by the Wildlife Working Group described in the Sage Grouse Conservation Measures in Appendix D, Attachment 3. Additional mitigation has been proposed for wetland vegetation in Section 3.11 (Mitigation Measure 3.11.3.3-3).	N/A	**Mitigation Measure 3.23.3.5-4:** Mitigation for the potential loss of water would include the development of six water sites (Figure 3.13.1) that were identified for wild horses and two additional sites that would be designed specifically for wildlife use. Although the sites shown on Figure 3.13.1 were identified as part of mitigation to wild horses (Section 3.13), development of the sites could also result in indirect beneficial impacts to wildlife species throughout the Project Area. The locations and design of the wildlife-specific water developments would be determined by the Wildlife Working Group described in the Sage Grouse Conservation Measures in Appendix D, Attachment 3. Additional mitigation has been proposed for wetland vegetation in Section 3.11 (Mitigation Measure 3.11.3.3-3).	**Mitigation Measure 3.23.3.6-4:** Mitigation for the potential loss of water would include the development of six water sites (Figure 3.13.1) that were identified for wild horses and two additional sites that would be designed specifically for wildlife use. Although the sites shown on Figure 3.13.1 were identified as part of mitigation to wild horses (Section 3.13), development of the sites could also result in indirect beneficial impacts to wildlife species throughout the Project Area. The locations and design of the wildlife-specific water developments would be determined by the Wildlife Working Group described in the Sage Grouse Conservation Measures in Appendix D, Attachment 3. Additional mitigation has been proposed for wetland vegetation in Section 3.11 (Mitigation Measure 3.11.3.3-3).	**Mitigation Measure 3.23.3.7-4:** Mitigation for the potential loss of water would include the development of six water sites (Figure 3.13.1) that were identified for wild horses and two additional sites that would be designed specifically for wildlife use. Although the sites shown on Figure 3.13.1 were identified as part of mitigation to wild horses (Section 3.13), development of the sites could also result in indirect beneficial impacts to wildlife species throughout the Project Area. The locations and design of the wildlife-specific water developments would be determined by the Wildlife Working Group described in the Sage Grouse Conservation Measures in Appendix D, Attachment 3. Additional mitigation has been proposed for wetland vegetation in Section 3.11 (Mitigation Measure 3.11.3.3-3).

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measures 3.11.3.3-1 and 3.23.3.3-4 would reduce impacts to the loss of riparian habitat during Project activities. Replacement with local cuttings, plugs, or seeds would ensure no long-term impacts to the temporary loss of riparian vegetation.	N/A	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measures 3.11.3.3-1 and 3.23.3.3-4 would reduce impacts to the loss of riparian habitat during Project activities. Replacement with local cuttings, plugs, or seeds would ensure no long-term impacts to the temporary loss of riparian vegetation.	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measures 3.11.3.3-1 and 3.23.3.3-4 would reduce impacts to the loss of riparian habitat during Project activities. Replacement with local cuttings, plugs, or seeds would ensure no long-term impacts to the temporary loss of riparian vegetation.	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measures 3.11.3.3-1 and 3.23.3.3-4 would reduce impacts to the loss of riparian habitat during Project activities. Replacement with local cuttings, plugs, or seeds would ensure no long-term impacts to the temporary loss of riparian vegetation.
	Pages 3-664 through 3-664		**Pages 3-671 through 3-671**	**Pages 3-676 through 3-676**	**Pages 3-680 through 3-680**
Impact:	**Impact 3.23.3.3-5:** The result of the assessment for wildlife (terrestrial and avian) indicates a low risk based on calculated species-specific toxicity criteria using recent EPA developed TRVs. None of the chemicals of potential ecological concern identified in the predicted pit lake water poses a credible risk to wildlife that may inhabit the area and use the pit lake as a drinking water source.	N/A	**Impact 3.23.3.5-5:** The result of the assessment for wildlife (terrestrial and avian) indicate a low risk based on calculated species-specific toxicity criteria using recent EPA developed TRVs. None of the chemicals of potential ecological concern identified in the predicted pit lake water poses a credible risk to wildlife that may inhabit the area and use the pit lake as a drinking water source.	**Impact 3.23.3.6-5:** For wildlife (terrestrial and avian), the results of the SLERA assessment indicate a low risk based on calculated species-specific toxicity criteria using more recent EPA developed TRVs. None of the chemicals of potential ecological concern identified in the predicted pit lake water poses a credible risk to wildlife that may inhabit the area and use the pit lake as a drinking water source.	**Impact 3.23.3.7-5:** For wildlife (terrestrial and avian), the results of the SLERA assessment indicate a low risk based on calculated species-specific toxicity criteria using more recent EPA developed TRVs. None of the chemicals of potential ecological concern identified in the predicted pit lake water poses a credible risk to wildlife that may inhabit the area and use the pit lake as a drinking water source.
Significance of the Impact:	**Significance of the Impact:** The potential to adversely affect the health of terrestrial or avian life is considered negligible. Based on the predicted pit lake chemistry, calculated toxicity criteria, and predicted utilization of the open pit water by wildlife, the overall ecological risk of the Proposed Action is considered to be low. The impact is not considered significant.	N/A	**Significance of the Impact:** The potential to adversely affect the health of terrestrial or avian life is considered negligible. Based on the predicted pit lake chemistry, calculated toxicity criteria, and predicted utilization of the open pit water by wildlife, the overall ecological risk of the Proposed Action is considered to be low. The impact is not considered significant.	**Significance of the Impact:** The potential to adversely affect the health of terrestrial or avian life is considered negligible. Based on the predicted pit lake chemistry, calculated toxicity criteria, and predicted utilization of the open pit water by wildlife, the overall ecological risk from the Off-Site Transfer of Concentrate for Processing Alternative is considered to be low. The impact is not considered significant.	**Significance of the Impact:** The potential to adversely affect the health of terrestrial or avian life is considered negligible. Based on the predicted pit lake chemistry, calculated toxicity criteria, and predicted utilization of the Mount Hope open pit water by wildlife, the overall ecological risk from the Slower, Longer Project Alternative is considered to be low. The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Pages 3-664 through 3-665		**Pages 3-671 through 3-672**	**Pages 3-676 through 3-676**	**Pages 3-680 through 3-681**
Impact:	**Impact 3.23.3.3-6:** Greater sage-grouse individuals as well as approximately 3,544 acres of PPH and approximately 1,965 acres of PGH within the Project Area could be impacted as a result of the Proposed Action.	N/A	**Impact 3.23.3.5-6:** The development of a perpetual lake over the backfill would create a potential ecological risk to mammalian and avian species that used the lake.	**Impact 3.23.3.6-6:** Greater sage-grouse individuals as well as approximately 3,544 acres of PPH and approximately 1,965 acres of PGH within the Project Area could be impacted as a result of the Proposed Action.	**Impact 3.23.3.7-6:** Greater sage-grouse individuals as well as approximately 3,544 acres of PPH and approximately 1,965 acres of PGH within the Project Area could be impacted as a result of the Slower, Longer Project Alternative.
Significance of the Impact:	**Significance of the Impact:** This impact is considered potentially significant with respect to greater sage-grouse, a USFWS candidate species and a BLM sensitive species, and greater sage-grouse habitat and the following mitigation measures have been identified.	N/A	**Significance of the Impact:** This impact is considered potentially significant with respect to those mammalian and avian species and the following mitigation measure has been identified.	**Significance of the Impact:** This impact is considered potentially significant with respect to greater sage-grouse, a USFWS candidate species and a BLM sensitive species, and greater sage-grouse habitat and the following mitigation measures have been identified.	**Significance of the Impact:** This impact is considered potentially significant with respect to greater sage-grouse, a USFWS candidate species and a BLM sensitive species, and greater sage-grouse habitat and the following mitigation measures have been identified.
Mitigation Measure:	**Mitigation Measure 3.23.3.3-6:** Mitigation measures are identified in the Mount Hope Sage Grouse Conservation Measures (Appendix D, Attachment 3). The measures identified in this attachment include the following: conservation measures for low profile camouflaged equipment, water pipelines, transmission lines, nesting/perching maintenance, noise, perimeter fence collision prevention, seasonal restrictions, and minimization of additional disturbance; off-site mitigation; formation of a Wildlife Working Group; research; and treatment options for burial of the above-ground powerline and vegetation treatments. Additional mitigation developed for pygmy rabbits (Mitigation Measure 3.23.3.3-9) would reduce the effect to sagebrush habitat utilized by greater sage-grouse. Mitigation Measure 3.13.3.3-1 also minimizes habitat fragmentation from the wellfield pipeline.	N/A	**Mitigation Measure 3.23.3.5-6:** Mitigation under the Partial Backfill Alternative would be the same as mitigation under the Water Resources - Water Quality for the Partial Backfill Alternative (Mitigation Measure 3.3.3.5-3).	**Mitigation Measure 3.23.3.6-6:** Mitigation under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as mitigation under the Proposed Action (Mitigation Measure 3.23.3.3-6).	**Mitigation Measure 3.23.3.7-6:** The mitigation measures identified in the Sage Grouse Conservation Measures (Appendix D, Attachment 3).
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.23.3.3-6 would reduce impacts to greater sage-grouse during Project activities to less than significant through the implementation of conservation measures and off-site mitigation (Appendix D).	N/A	**Effectiveness of Mitigation and Residual Effects:** Mitigation for this impact would require the removal of sufficient backfill material for the formation of an evaporative ground water sink. Implementation of this mitigation would otherwise be inconsistent with the reasoning for selecting this alternative.	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.23.3.6-6 would reduce impacts to greater sage-grouse during Project activities to less than significant through the implementation of conservation measures and off-site mitigation (Appendix D, Attachment 3).	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.23.3.6-6 would reduce impacts to greater sage-grouse during Project activities to less than significant through the implementation of conservation measures and off-site mitigation (Appendix D, Attachment 3).
	Pages 3-665 through 3-666		**Pages 3-672 through 3-672**	**Pages 3-676 through 3-677**	**Pages 3-681 through 3-681**
Impact:	**Impact 3.23.3.3-7:** Approximately 8,355 acres of migratory bird and raptor habitat would be directly removed over the 44-year mine life as a result of the Proposed Action.	N/A	**Impact 3.23.3.5-7:** Greater sage-grouse individuals as well as approximately 3,544 acres of PPH and approximately 1,965 acres of PGH within the Project Area could be impacted as a result of the Proposed Action.	**Impact 3.23.3.6-7:** Approximately 8,355 acres of migratory bird and raptor habitat would be directly removed over the 44-year mine life as a result of the Proposed Action.	**Impact 3.23.3.7-7:** Approximately 8,355 acres of migratory bird and raptor habitat would be directly removed over the extended mine life as a result of the Slower, Longer Project Alternative.
Significance of the Impact:	**Significance of the Impact:** This impact is considered potentially significant with respect to vegetation removal during the avian breeding season that results in a violation of the MBTA and the following mitigation measure has been identified.	N/A	**Significance of the Impact:** This impact is considered potentially significant with respect to greater sage-grouse, a USFWS candidate species and a BLM sensitive species, and greater sage-grouse habitat and the following mitigation measure have been identified.	**Significance of the Impact:** This impact is considered potentially significant with respect to vegetation removal during the avian breeding season that results in a violation of the MBTA and the following mitigation measure has been identified.	**Significance of the Impact:** This impact is considered potentially significant with respect to vegetation removal during the avian breeding season that results in a violation of the MBTA and the following mitigation is proposed.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
Mitigation Measure:	**Mitigation Measure 3.23.3.3-7:** Land clearing would be conducted outside the avian breeding season, which is March 1st through August 31st for raptors and April 1st through August 1st for other migratory birds. If this is not possible, then a qualified biologist would survey the area to be cleared prior to clearing, within 14 days of disturbance. If disturbance has not occurred within 14 days of the survey, another survey would be conducted. If active nests were identified, or if other evidence of nesting (mated pairs, territorial defense, carrying nesting material, transporting food) was observed as a result of this survey, then a protective buffer (the size of which would depend on the requirements of the species) would be delineated and the delineated protective buffer avoided to prevent destruction or disturbance to nests until the nests were no longer active or nesting activities were no longer observed.	N/A	**Mitigation Measure 3.23.3.5-7:** Mitigation under the Partial Backfill Alternative would be the same as mitigation under the Proposed Action (Mitigation Measure 3.23.3.3-6).	**Mitigation Measure 3.23.3.6-7:** Mitigation under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as mitigation under the Proposed Action (Mitigation Measure 3.23.3.5-7).	**Mitigation Measure 3.23.3.7-7:** Land clearing would be conducted outside the avian breeding season. If this is not possible, then a qualified biologist would survey the area to be cleared prior to clearing. If active nests were identified, or if other evidence of nesting (mated pairs, territorial defense, carrying nesting material, transporting food) was observed as a result of this survey, then a protective buffer (the size of which would depend on the requirements of the species) would be delineated and the delineated protective buffer avoided to prevent destruction or disturbance to nests until the nests were no longer active or nesting activities were no longer observed.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.23.3.3-7 would reduce impacts to migratory birds during Project activities to less than significant by ensuring no direct impacts to nesting birds would occur.	N/A	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.23.3.3-6 would reduce impacts to greater sage-grouse during Project activities to less than significant through the implementation of conservation measures and off-site mitigation (Appendix D, Attachment 3).	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.23.3.3-7 would reduce impacts to migratory birds during Project activities to less than significant by ensuring no direct impacts to nesting birds would occur.	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.23.3.3-7 would reduce impacts to migratory birds during Project activities to less than significant by ensuring no direct impacts to nesting birds would occur.
	Pages 3-666 through 3-667		**Pages 3-672 through 3-672**	**Pages 3-677 through 3-677**	**Pages 3-681 through 3-681**
Impact:	**Impact 3.23.3.3-8:** Loud or sudden noises associated with the Proposed Action could result in an indirect impact (i.e., disturbance) to golden eagles nesting east of the Project Area.	N/A	**Impact 3.23.3.5-8:** Approximately 8,355 acres of migratory bird and raptor habitat would be directly removed over the 44-year mine life as a result of the Proposed Action.	**Impact 3.23.3.6-8:** Loud or sudden noises associated with the Off-Site Transfer of Ore Concentrate for Processing Alternative could result in an indirect impact (i.e., disturbance) to golden eagles nesting east of the Project Area.	**Impact 3.23.3.7-8:** Loud or sudden noises associated with the Slower, Longer Project Alternative could result in an indirect impact (i.e., disturbance) to golden eagles nesting east of the Project Area.
Significance of the Impact:	**Significance of the Impact:** This impact is considered potentially significant with respect to Project activities during the golden eagle breeding season that may result in a violation of the Bald and Golden Eagle Protection Act and the following monitoring and adaptive management mitigation have been identified.	N/A	**Significance of the Impact:** This impact is considered potentially significant with respect to vegetation removal during the avian breeding season that results in a violation of the MBTA and the following mitigation measure has been identified.	**Significance of the Impact:** This impact is considered potentially significant with respect to Project activities during the golden eagle breeding season that may result in a violation of the Bald and Golden Eagle Protection Act and the following mitigation measure has been identified.	**Significance of the Impact:** This impact is considered potentially significant with respect to Project activities during the golden eagle breeding season that may result in a violation of the Bald and Golden Eagle Protection Act and the following mitigation measure has been identified.
Mitigation Measure:	**Mitigation Measure 3.23.3.3-8:** All suitable golden eagle nesting habitat located within a five-mile radius of the Project Area boundary would be surveyed twice a year by a qualified biologist for the life of the Project to check the use status of golden eagle nests and habitat. If a nest is determined to be active, the nests would be monitored by video (with still images recorded every five minutes) and the recording would be reviewed by a qualified biologist once a week until the young have fledged. During the 18- to 24-month construction phase, the timing of weekly monitoring of active nests would occur from sunrise to sunset by video (with still images recorded every five minutes). During the 44-year mine life, the weekly monitoring for active nests would coincide with blasting activities. The video camera would record the nest beginning two hours before the blast and end two hours after the blast (with continuous video images recording). Annual reports would be submitted to the BLM biologist summarizing the results of the surveys. Following one year of monitoring, the qualified biologist would develop interpretable metrics to evaluate whether disturbance affects golden eagles. If there are impacts to golden eagles identified, the qualified biologist would coordinate with the BLM and USFWS to develop an adaptive management strategy to mitigate impacts for subsequent years. If a negative impact to nesting golden eagles is detected during monitoring, the BLM biologist would be contacted by electronic mail or phone by the next business day.	N/A	**Mitigation Measure 3.23.3.5-8:** Mitigation under the Partial Backfill Alternative would be the same as mitigation under the Proposed Action (Mitigation Measure 3.23.3.5-7).	**Mitigation Measure 3.23.3.6-8:** Mitigation under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as mitigation under the Proposed Action (Mitigation Measure 3.23.3.3-8).	**Mitigation Measure 3.23.3.7-8:** Mitigation under the Slower, Longer Project Alternative would be the same as mitigation under the Proposed Action (Mitigation Measure 3.23.3.3-8).
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.23.3.3-8 would reduce impacts to golden eagles during Project activities to less than significant by ensuring no direct impacts to nesting birds would occur.	N/A	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.23.3.3-7 would reduce impacts to migratory birds during Project activities to less than significant by ensuring no direct impacts to nesting birds would occur.	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.23.3.3-8 would reduce impacts to golden eagles during Project activities to less than significant by ensuring no direct impacts to nesting birds would occur.	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.23.3.3-8 would reduce impacts to golden eagles during Project activities to less than significant by ensuring no direct impacts to nesting birds would occur.
	Pages 3-667 through 3-667		**Pages 3-673 through 3-673**	**Pages 3-677 through 3-677**	**Pages 3-681 through 3-682**
Impact:	**Impact 3.23.3.3-9:** Pygmy rabbit individuals and habitat could be impacted as a result of the Proposed Action.	N/A	**Impact 3.23.3.5-9:** Loud or sudden noises associated with the Partial Backfill Alternative could result in an indirect impact (i.e., disturbance) to golden eagles nesting east of the Project Area.	**Impact 3.23.3.6-9:** Pygmy rabbit individuals and habitat could be impacted as a result of the Proposed Action.	**Impact 3.23.3.7-9:** Pygmy rabbit individuals and habitat could be impacted as a result of the Proposed Action.
Significance of the Impact:	**Significance of the Impact:** This impact is not considered significant with respect to pygmy rabbits; however, the BLM proposes the following mitigation measure.	N/A	**Significance of the Impact:** This impact is considered potentially significant with respect to Project activities during the golden eagle breeding season that may result in a violation of the Bald and Golden Eagle Protection Act and the following	**Significance of the Impact:** This impact is not considered significant with respect to pygmy rabbits; however, the BLM proposes the following mitigation measure.	**Significance of the Impact:** This impact is not considered significant with respect to pygmy rabbits; however, the BLM proposes the following mitigation measure.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
			mitigation measure has been identified.		
Mitigation Measure:	**Mitigation Measure 3.23.3.3-9:** EML would fund future sagebrush habitat improvement projects in the area that would directly benefit pygmy rabbits. Based on a ratio of two acres per every acre disturbed, EML would provide 950 acres of habitat improvement projects. Projects would be selected by the Wildlife Working Group which would review greater sage-grouse habitat projects (described in Appendix D, Attachment 3). Projects that benefit both greater sage-grouse and pygmy rabbits could count toward both acreage requirements as approved by the Wildlife Working Group.	N/A	**Mitigation Measure 3.23.3.5-9:** Mitigation under the Partial Backfill Alternative would be the same as mitigation under the Proposed Action (Mitigation Measure 3.23.3.3-8).	**Mitigation Measure 3.23.3.6-9:** Mitigation under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as mitigation under the Proposed Action (Mitigation Measure 3.23.3.3-9).	**Mitigation Measure 3.23.3.7-9:** Mitigation under the Slower, Longer Project Alternative would be the same as mitigation under the Proposed Action (Mitigation Measure 3.23.3.3-9).
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Although direct effects to pygmy rabbits and their habitat would occur in the Project Area, this mitigation would ensure additional pygmy rabbit habitat is created to replace the habitat removed at a two to one ratio.	N/A	**Effectiveness of Mitigation and Residual Effects:** Mitigation Measure 3.23.3.3-8 would reduce impacts to golden eagles during Project activities to less than significant by ensuring no direct impacts to nesting birds would occur.	**Effectiveness of Mitigation and Residual Effects:** Although direct effects to pygmy rabbits and their habitat would occur in the Project Area, this mitigation would ensure additional pygmy rabbit habitat is created to replace the habitat removed at a two to one ratio.	**Effectiveness of Mitigation and Residual Effects:** Although direct effects to pygmy rabbits and their habitat would occur in the Project Area, this mitigation would ensure additional pygmy rabbit habitat is created to replace the habitat removed at a two to one ratio.
	Pages 3-668 through 3-668		**Pages 3-673 through 3-673**	**Pages 3-677 through 3-678**	**Pages 3-682 through 3-682**
Impact:	**Impact 3.23.3.3-10:** There may be a decrease in flows within Henderson Creek, which may affect the creek's criteria for use in LCT recovery.	N/A	**Impact 3.23.3.5-10:** Pygmy rabbit individuals and habitat could be impacted as a result of the Proposed Action.	**Impact 3.23.3.6-10:** There may be a decrease in flows within Henderson Creek, which may affect the creek's criteria for use in LCT recovery.	**Impact 3.23.3.7-10:** There may be a decrease in flows within Henderson Creek, which may affect the creek's criteria for use in LCT recovery.
Significance of the Impact:	**Significance of the Impact:** This impact is considered potentially significant with respect to a LCT recovery creek. The following mitigation has been identified by the BLM to limit to potential effects to Henderson Creek and to ensure that there would not be an effect to Birch Creek or Pete Hanson Creek.	N/A	**Significance of the Impact:** This impact is not considered significant with respect to pygmy rabbits; however, the BLM proposes the following mitigation measure.	**Significance of the Impact:** This impact is considered potentially significant with respect to a LCT recovery creek. The following mitigation has been identified by the BLM to limit the potential effect to Henderson Creek and ensure that there would not be an effect to Birch Creek or Pete Hanson Creek.	**Significance of the Impact:** This impact is considered potentially significant with respect to a LCT recovery creek. The following mitigation has been identified by the BLM to limit to potential effects to Henderson Creek and to ensure that there would not be an effect to Birch Creek or Pete Hanson Creek.
Mitigation Measure:	**Mitigation Measure 3.23.3.3-10:** The mitigation measures identified in Section 3.2.3 would be sufficient to mitigate the impacts to LCT from the Proposed Action.	N/A	**Mitigation Measure 3.23.3.5-10:** Mitigation under the Partial Backfill Alternative would be the same as mitigation under the Proposed Action (Mitigation Measure 3.23.3.3-9).	**Mitigation Measure 3.23.3.6-10:** Mitigation under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as mitigation under the Proposed Action (Mitigation Measure 3.23.3.3-10).	**Mitigation Measure 3.23.3.7-10:** The mitigation measure identified in Section 3.2.3 to ensure that the development of the ten-foot drawdown contour is consistent with the analysis in this EIS (Mitigation Measure 3.2.3.3-2a and 3.2.3.3-2b) would be sufficient to mitigate the impact to LCT from the Proposed Action.
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.2.3.3-2b and the use of any of the options outlined in Section 3.2.3 would be effective at mitigating the impacts from reduced surface water flows. The effectiveness of Mitigation Measure 3.2.3.3-2c, if implemented, is less certain since the implementation would be many decades in the future. However, if measures used in Mitigation Measure 3.2.3.3-2b are implemented, then the measure should be effective at mitigating the impacts from reduced surface water flows. Over a long period of time (tens to hundreds of years) the effects to most surface water flows would diminish; however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity.	N/A	**Effectiveness of Mitigation and Residual Effects:** Although direct effects to pygmy rabbits and their habitat would occur in the Project Area, this mitigation would ensure additional pygmy rabbit habitat is created to replace the habitat removed at a two to one ratio.	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.2.3.3-2b and the use of any of the options outlined in Section 3.2.3 would be effective at mitigating the impacts from reduced surface water flows. The effectiveness of Mitigation Measure 3.2.3.3-2c, if implemented, is less certain since it would be many decades in the future. However, if measures used in Mitigation Measure 3.2.3.3-2b are implemented, then the measure should be effective at mitigating the impacts from reduced surface water flows. Over a long period of time (tens to hundreds of years) the effects to most surface water flows would diminish; however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity.	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.2.3.3-2b and the use of any of the options outlined in Section 3.2.3 would be effective at mitigating the impacts from reduced surface water flows. The effectiveness of Mitigation Measure 3.2.3.3-2c, if implemented, is less certain since it would be many decades in the future. However, if measures used in Mitigation Measure 3.2.3.3-2b are implemented, then the measure should be effective at mitigating the impacts from reduced surface water flows. Over a long period of time (tens to hundreds of years) the effects to most surface water flows would diminish; however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity.
	Pages 3-669 through 3-669		**Pages 3-673 through 3-674**	**Pages 3-678 through 3-678**	**Pages 3-682 through 3-682**
Impact:	**Impact 3.23.3.3-11:** Bat foraging habitat would be impacted as a result of the Proposed Action over the 44-year mine life.	N/A	**Impact 3.23.3.5-11:** There may be a decrease in flows within Henderson Creek, which may affect the creek's criteria for use in LCT recovery.	**Impact 3.23.3.6-11:** Bat foraging habitat would be impacted as a result of the Partial Backfill Alternative for the duration of the Project.	**Impact 3.23.3.7-11:** Bat foraging habitat would be impacted as a result of the Slower, Longer Project Alternative for the duration of the Project.
Significance of the Impact:	**Significance of the Impact:** This impact is not considered significant; however, the following mitigation is proposed.	N/A	**Significance of the Impact:** This impact is considered potentially significant with respect to a LCT recovery creek. The following mitigation has been identified by the BLM to limit the potential effect to Henderson Creek and to ensure that there would not be an effect to Birch Creek or Pete Hanson Creek.	**Significance of the Impact:** This impact is not considered significant; however, the following mitigation is proposed.	**Significance of the Impact:** This impact is not considered significant; however, the following mitigation is proposed.
Mitigation Measure:	**Mitigation Measure 3.23.3.3-11:** In order to minimize impacts to bat habitat, prior to the initiation of Project activities, EML would close those mine workings that would be removed over the life of the Project (after bats have been evacuated) and install bat-friendly closures on openings that would not be directly impacted by the Project in order to preserve access to the remaining bat habitat (also see Appendix D, Attachment 4).	N/A	**Mitigation Measure 3.23.3.5-11:** Mitigation under the Partial Backfill Alternative would be the same as mitigation under the Proposed Action (Mitigation Measure 3.23.3.3-10).	**Mitigation Measure 3.23.3.6-11:** In order to minimize impacts to bat habitat, prior to the initiation of Project activities, EML would close those mine workings that would be removed over the life of the Project (after bats have been evacuated) and install bat-friendly closures on openings that would not be directly impacted by the Project in order to preserve access to the remaining bat habitat (also see Appendix D, Attachment 4).	**Mitigation Measure 3.23.3.7-11:** In order to minimize impacts to bat habitat, prior to the initiation of Project activities, EML would close those mine workings that would be removed over the life of the Project (after bats have been evacuated) and install bat-friendly closures on openings that would not be directly impacted by the Project in order to preserve access to the remaining bat habitat (also see Appendix D, Attachment 4).
Effectiveness of Mitigation and Residual Effects:	**Effectiveness of Mitigation and Residual Effects:** The protection of specific mine openings in the Project Area would be effective as mitigation for the loss of habitat associated with those mines that would be removed as a result of Project activities. Bats excluded from the closed mines in the Project Area are familiar with the mine openings that would remain accessible and would take advantage of its preservation.	N/A	**Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.2.3.3-2b and the use of any of the options outlined in Section 3.2.3 would be effective at mitigating the impacts from reduced surface water flows. The effectiveness of Mitigation Measure 3.2.3.3-2c, if implemented, is less certain since it would be many decades in the future. However, if measures used in Mitigation Measure	**Effectiveness of Mitigation and Residual Effects:** The protection of specific mine openings in the Project Area would be effective as mitigation for the loss of habitat associated with those mines that would be removed as a result of Project activities. Bats excluded from the closed mines in the Project Area are familiar with the mine openings that would remain accessible and would take advantage of its preservation.	**Effectiveness of Mitigation and Residual Effects:** The protection of specific mine openings in the Project Area would be effective as mitigation for the loss of habitat associated with those mines that would be removed as a result of Project activities. Bats excluded from the closed mines in the Project Area are familiar with the mine openings that would remain accessible and would take advantage of its preservation.

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
			3.2.3.3-2b are implemented, then the measure should be effective at mitigating the impacts from reduced surface water flows. Over a long period of time (tens to hundreds of years) the effects to most surface water flows would diminish; however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity.		
			Pages 3-674 through 3-674		
Impact:	N/A	N/A	**Impact 3.23.3.5-12:** Bat foraging habitat would be impacted as a result of the Partial Backfill Alternative for the duration of the Project.	N/A	N/A
Significance of the Impact:	N/A	N/A	**Significance of the Impact:** This impact is not considered significant; however, the following mitigation is proposed.	N/A	N/A
Mitigation Measure:	N/A	N/A	**Mitigation Measure 3.23.3.5-12:** In order to minimize impacts to bat habitat, prior to the initiation of Project activities, EML would close those mine workings that would be removed over the life of the Project (after bats have been evacuated) and install bat-friendly closures on openings that would not be directly impacted by the Project in order to preserve access to the remaining bat habitat (also see Appendix D, Attachment 4).	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	**Effectiveness of Mitigation and Residual Effects:** The protection of specific mine openings in the Project Area would be effective as mitigation for the loss of habitat associated with those mines that would be removed as a result of Project activities. Bats excluded from the closed mines in the Project Area are familiar with the mine openings that would remain accessible and would take advantage of its preservation.	N/A	N/A
TRANSPORTATION AND ACCESS					
	Pages 3-685 through 3-685		**Pages 3-687 through 3-688**	**Pages 3-689 through 3-690**	**Pages 3-691 through 3-692**
Impact:	**Impact 3.24.3.3-1:** For the 18- to 24-month construction period of the Project, there would be a peak increase in traffic from trucks, cars, pickup trucks, vans, and buses of between 150 and 700 percent over the existing traffic volumes on SR 278 and U.S. Highway 50.	N/A	**Impact 3.24.3.5-1:** For the 18- to 24-month construction period of the Project, there would be a peak increase in traffic from trucks, cars, pickup trucks, vans, and buses of between 150 and 700 percent over the existing traffic volumes on SR 278 and U.S. Highway 50.	**Impact 3.24.3.6-1:** For the 18- to 24-month construction period of the Project, there would be a peak increase in traffic from trucks, cars, pickup trucks, vans, and buses of between 150 and 700 percent over the existing traffic volumes on SR 278 and U.S. Highway 50.	**Impact 3.24.3.7-1:** For the 18- to 24-month construction period of the Project, there would be a peak increase in traffic from trucks, cars, pickup trucks, vans, and buses of between 150 and 700 percent over the existing traffic volumes on SR 278 and U.S. Highway 50.
Significance of the Impact:	**Significance of the Impact:** The impact is considered significant. SR 278 and U.S. Highway 50 are public roads that are maintained by the NDOT, and the NDOT has jurisdiction over these routes. The Roberts Creek Road is a public road maintained by Eureka County and Eureka County has jurisdiction over this route. It is beyond the BLM's jurisdiction to impose mitigation measures for activities on these public roads. See Section 3.26 of this EIS.	N/A	**Significance of the Impact:** The impact is considered significant. SR 278 and U.S. Highway 50 are public roads that are maintained by the NDOT, and the NDOT has jurisdiction over these routes. The Roberts Creek Road is a public road maintained by Eureka County and Eureka County has jurisdiction over this route. It is beyond the BLM's jurisdiction to impose mitigation measures for activities on these public roads. See Section 3.26 of this EIS.	**Significance of the Impact:** The impact is considered significant. SR 278 and U.S. Highway 50 are public roads that are maintained by the NDOT, and the NDOT has jurisdiction over these routes. The Roberts Creek Road is a public road maintained by Eureka County and Eureka County has jurisdiction over this route. It is beyond the BLM's jurisdiction to impose mitigation measures for activities on these public roads. See Section 3.26 of this EIS.	**Significance of the Impact:** The impact is considered significant. SR 278 and U.S. Highway 50 are public roads that are maintained by the NDOT, and the NDOT has jurisdiction over these routes. The Roberts Creek Road is a public road maintained by Eureka County and Eureka County has jurisdiction over this route. It is beyond the BLM's jurisdiction to impose mitigation measures for activities on these public roads. See Section 3.26 of this EIS.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
	Pages 3-685 through 3-686		**Pages 3-688 through 3-688**	**Pages 3-690 through 3-690**	**Pages 3-692 through 3-692**
Impact:	**Impact 3.24.3.3-2:** For the life of the Project, which could be up to 70 years, there would be an increase in trucks (approximately 13 percent) on SR 278 and an increase in car, pickup, van, and bus traffic of between 26 and 34 percent on SR 278 and 12 percent on U.S. Highway 50.	N/A	**Impact 3.24.3.5-2:** For the life of the Project, which could be up to 70 years, there would be an increase in trucks (approximately 13 percent) on SR 278 and an increase in car, pickup, van, and bus traffic of between 26 and 34 percent on SR 278 and 12 percent on U.S. Highway 50.	**Impact 3.24.3.6-2:** For the life of the Project, which could be up to 70 years, there would be an increase in trucks (approximately 13 percent) on SR 278 and an increase in car, pickup, van, and bus traffic of between 26 and 34 percent on SR 278 and 12 percent on U.S. Highway 50.	**Impact 3.24.3.7-2:** For the life of the Project, which could be up to 114 years, there would be an increase in trucks (approximately six percent) on SR 278 and an increase in car, pickup, van, and bus traffic of between 18 and 23 percent on SR 278 and six percent on U.S. Highway 50.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant. SR 278 and U.S. Highway 50 are public roads that are maintained by the NDOT, and the NDOT has jurisdiction over these routes. It is beyond the BLM's jurisdiction to impose mitigation measures for activities on these public roads. See Section 3.26 of this EIS.	N/A	**Significance of the Impact:** This impact is not considered less than significant. SR 278 and U.S. Highway 50 are public roads that are maintained by the NDOT, and the NDOT has jurisdiction over these routes. It is beyond the BLM's jurisdiction to impose mitigation measures for activities on these public roads. See Section 3.26 of this EIS.	**Significance of the Impact:** This impact is considered less than significant. SR 278 and U.S. Highway 50 are public roads that are maintained by the NDOT, and the NDOT has jurisdiction over these routes. It is beyond the BLM's jurisdiction to impose mitigation measures for activities on these public roads (see Section 3.26 of this EIS).	**Significance of the Impact:** This impact is considered less than significant. SR 278 and U.S. Highway 50 are public roads that are maintained by the NDOT, and the NDOT has jurisdiction over these routes. It is beyond the BLM's jurisdiction to impose mitigation measures for activities on these public roads. See Section 3.26 of this EIS.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A

	PROPOSED ACTION	NO ACTION ALTERNATIVE	PARTIAL BACKFILL ALTERNATIVE	OFF-SITE TRANSFER OF ORE CONCENTRATE FOR PROCESSING ALTERNATIVE	SLOWER, LONGER PROJECT ALTERNATIVE
	Pages 3-686 through 3-686		**Pages 3-688 through 3-688**	**Pages 3-690 through 3-691**	**Pages 3-692 through 3-693**
Impact:	**Impact 3.24.3.3-3:** For the life of the Project, which could be up to 70 years, access through the Project Area would be restricted. Public access to surrounding areas would remain available throughout the construction, mining, and reclamation phases of the Project.	N/A	**Impact 3.24.3.5-3:** For the life of the Project, which could be up to 70 years, access through the Project Area would be restricted. Public access to surrounding areas would remain available throughout the construction, mining, and reclamation phases of the Project.	**Impact 3.24.3.6-3:** For the life of the Project, which could be up to 70 years, access through the Project Area would be restricted. Public access to surrounding areas would remain available throughout the construction, mining, and reclamation phases of the Project.	**Impact 3.24.3.7-3:** For the life of the Project, which could be up to twice as long (approximately 115 years) as the Proposed Action, access through the Project Area would be restricted. Public access to surrounding areas would remain available throughout the construction, mining, and reclamation phases of the Project.
Significance of the Impact:	**Significance of the Impact:** This impact is not considered significant.	N/A	**Significance of the Impact:** This impact is considered less than significant.	**Significance of the Impact:** This impact is considered less than significant.	**Significance of the Impact:** This impact is considered less than significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A
FOREST PRODUCTS					
	Pages 3-697 through 3-697	**Pages 3-698 through 3-698**	**Pages 3-698 through 3-699**	**Pages 3-699 through 3-699**	**Pages 3-700 through 3-700**
Impact:	**Impact 3.25.3.3-1:** Disturbance or removal of 3,296 acres of vegetation with a singleleaf piñon and Utah juniper component would occur as a result of the Proposed Action.	**Impact 3.25.3.4-1:** Implementation of the No Action Alternative would result in the removal of vegetation including forest products.	**Impact 3.25.3.5-1:** Disturbance or removal of 3,296 acres of vegetation with a singleleaf piñon and Utah juniper component would occur as a result of the Proposed Action.	**Impact 3.25.3.6-1:** Disturbance or removal of 3,296 acres of vegetation with a singleleaf piñon and Utah juniper component would occur as a result of the Proposed Action.	**Impact 3.25.3.7-1:** Disturbance or removal of 3,296 acres of vegetation with a singleleaf piñon and Utah juniper component would occur as a result of the Proposed Action.
Significance of the Impact:	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.	**Significance of the Impact:** The impact is not considered significant.
Mitigation Measure:	N/A	N/A	N/A	N/A	N/A
Effectiveness of Mitigation and Residual Effects:	N/A	N/A	N/A	N/A	N/A

1 INTRODUCTION: PURPOSE OF AND NEED FOR ACTION

1.1 Introduction and Location

Eureka Moly, LLC (EML) plans to develop the Mount Hope Project (Project) in central Nevada approximately 23 miles northwest of Eureka, Nevada, as shown in Figure 1.1.1. The Project would be located on public land administered by the Bureau of Land Management (BLM) and on private land controlled by EML (Figure 1.1.2). The specifics of the Project are outlined in the Project Plan of Operations (NVN-082096) (Plan) submitted in June 2006, and most recently revised in July 2011, which is on file and available for review at the BLM Mount Lewis Field Office (MLFO) in Battle Mountain, Nevada, during normal business hours (Monday through Friday, excluding holidays, from 7:30 a.m. to 4:30 p.m.). In addition, EML has submitted to the MLFO a right-of-way (ROW) Application and associated Plan of Development (POD) for portions of the planned Project activities. The ROW Application and POD (NVN-084632) were submitted in January 2008 for the 230-kilovolt (kV) transmission line from the Machacek Substation to the Project Substation located near the proposed mill. The ROW Application and POD are on file and available for review at the BLM MLFO in Battle Mountain during normal business hours. **There would be two ROWs associated with the powerline. The first is a short-term ROW (NVN-091272) associated with powerline construction. The second ROW is a long-term ROW (NVN-084632) for operation of the powerline. The boundary of the long-term ROW is within the boundary of the short-term ROW.** There would **also** be a ROW Application associated with the reroute of the 345-kV Falcon-Gondor transmission line. This ROW Application would modify the existing ROW (NVN-063162), which would be filed at the time the modified ROW is needed for the reroute in approximately Year 36. The 80-year Project would have an 18- **to 24**-month construction phase, 44 years of mining and ore processing, 30 years of reclamation, and five years of post-closure monitoring. The years of operation presented in this Environmental Impact Statement (EIS) are anticipated or nominal, and there is a potential the timing on the implementation or duration of components of the Project could vary.

The Project is located in all or parts of Mount Diablo Base and Meridian (MDBM), Township 20 North, Range 50 East, Sections 2-5, (T20N, R50E, Secs. 2-5); T20N, R52E, Secs. 5, 8, 9, 16, 21, 26-28, 34-36; T20N, R53E, Secs. 31-35; T21N, R50E, Secs. 1-3, 11-14, 23, 25, 26, 32-36; T21N, R51E, Secs. 1, 7, 8, 12, 16-18, **31**; T21N, R52E, Secs. 4-9, 18-20, 29, 32; T21½N, R51½E, All; T21½N, R52E, Secs. **4-6**; T22N, R50E, Secs. **25**, 36; T22N, R51E, Secs. 1, 2, 11-15, 20-**26, 28**-36; T22N, R51½E, All; T22N, R52E, Secs. 6-8, 17-20, 29-32; T23N, R51E, Secs. **25,** 35, 36 (Project Area). The Project Area, which covers **22,886** acres, includes the Mine Facility Area, ROW, and the well field development area (Figure 1.1.2). EML's holdings include 14 patented claims (approximately 260 acres of private land) and approximately 1,550 lode and millsite mining claims for a total land position of approximately 29,000 acres.

The Project Area can be reached by traveling on State Route (SR) 278 approximately 23 miles northwest of the Town of Eureka, Nevada. Alternatively, the Project Area can be reached by traveling south approximately 65 miles on SR 278 from Carlin, Nevada.

The proposed mining activities, which would be located on public lands, would be subject to BLM review and approval pursuant to the Federal Land Policy and Management Act (FLPMA) and subsequent surface management regulations (43 Code of Federal Regulations [CFR], Subpart 3809), as well as ROW principles and procedures (43 CFR, Subpart 2800). These activities constitute a federal action and would thus be subject to the National Environmental Policy Act (NEPA). The BLM has determined that the Project constitutes a major federal action and has determined that an EIS must be prepared to fulfill NEPA requirements. In determining the scope of the Proposed Action, the BLM has determined that actions on private lands are connected actions with those proposed on public lands (40 CFR 1502.4 (2) and 40 CFR 1508.25(a)). This EIS will also analyze impacts from private land activities.

This **Final** EIS has been prepared by the BLM, the Lead Agency with respect to compliance with the NEPA and its implementing regulations, and with the following cooperating agencies: Nevada Department of Wildlife (NDOW), Eureka County, and the National Park Service (NPS). The purpose of this document is to analyze the environmental effects of the Proposed Action, associated with the proposal by EML to develop the Mount Hope open pit mine, as well as alternatives to the Proposed Action.

The purposes of an EIS are as follows: a) to analyze potential impacts from the Project based on the Proposed Action; b) to identify reasonable alternatives; c) to inform the public about the Project; d) to solicit public comment on the Project and alternatives; and e) to provide agency decision makers with adequate information upon which to base the decision to approve or deny the Project or an alternative development scenario.

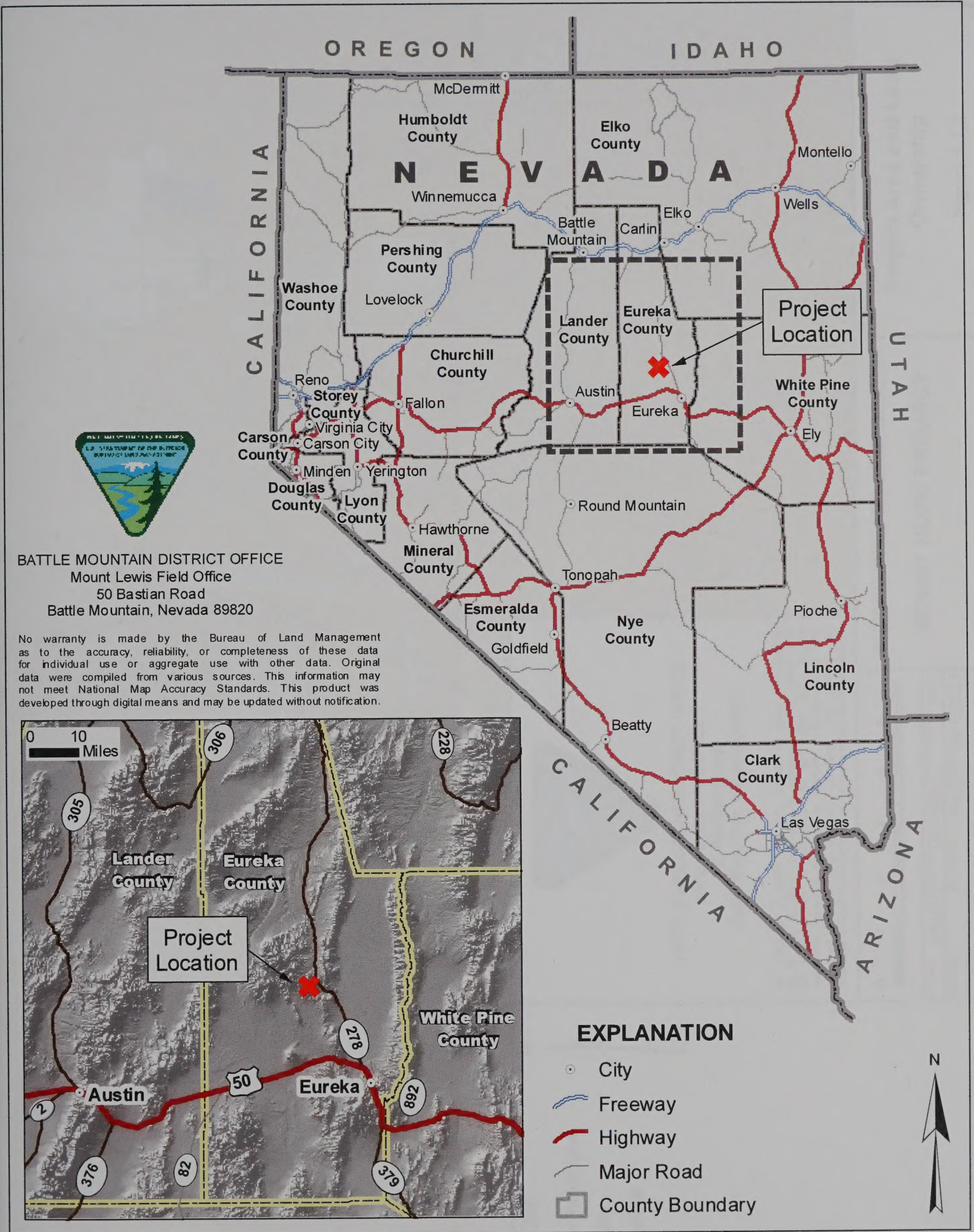
The EIS is prepared in compliance with the NEPA and in accordance with BLM's NEPA Handbook H-1790-1 (BLM 2008a), BLM Nevada State Office (NSO) Instruction Memorandum (IM) NV-90-435, and Council on Environmental Quality (CEQ) regulations on the analysis of cumulative impacts (40 CFR 1500). The EIS considers the quality of the natural environment based on the physical impacts to public and private lands that may result from implementation of the Proposed Action. All baseline data reports used in the preparation of the EIS are on file at the BLM MLFO.

All the spatial data presented in the figures and tables of this EIS are based on North American Datum (NAD) 83 georeferencing.

1.2 Project Background and History of Mining

Historical mining occurred within the Project Area from the 1870s through the 1940s. Exxon Minerals Corporation conducted exploration activities in the late 1970s through the early 1980s. Currently, EML is conducting exploration operations within the Project Area.

Disturbances associated with historic mining operations are located primarily on private land (patented claims). These disturbances consist of a core shed and storage building surrounded by a fence, underground mining operations, **waste rock disposal facilities** (WRDFs), and mill tailings. Some relatively small waste rock piles remain on the property, as well as three adits. One of these adits drains to a small man-made stock pond. Numerous historic mine workings are located throughout the Project Area, including unsecured and abandoned shafts, adits, open stopes, drifts, and prospects. The Project Area includes three historic mill tailings impoundments and one overflow tailings containment impoundment, all of which were associated with the ore concentrating activities conducted at the mine site during the 1940s. The three tailings impoundments contain approximately 25,000 cubic yards (yd^3) of spent tails. The largest of the three tailings impoundments, measuring approximately 300 feet wide by 550 feet long, contains


OREGON
IDAHO
CALIFORNIA
UTAH
ARIZONA
NEVADA
McDermitt
Humboldt County
Elko County
Montello
Winnemucca
Battle Mountain
Carlin
Elko
Wells
Pershing County
Washoe County
Lovelock
Lander County
Eureka County
Project Location
Churchill County
Reno
Storey County
Fallon
Austin
Eureka
White Pine County
Ely
Carson County
Virginia City
Carson City
Minden
Yerington
Douglas County
Lyon County
Round Mountain
Hawthorne
Mineral County
Tonopah
Esmeralda County
Goldfield
Nye County
Pioche
Lincoln County
Beatty
Clark County
Las Vegas
0 10 Miles
305
306
228
Lander County
Eureka County
Project Location
White Pine County
278
50
Austin
Eureka
2
892
376
82
379
EXPLANATION
City
Freeway
Highway
Major Road
County Boundary
N

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

0 20 40 60 80 100 Miles

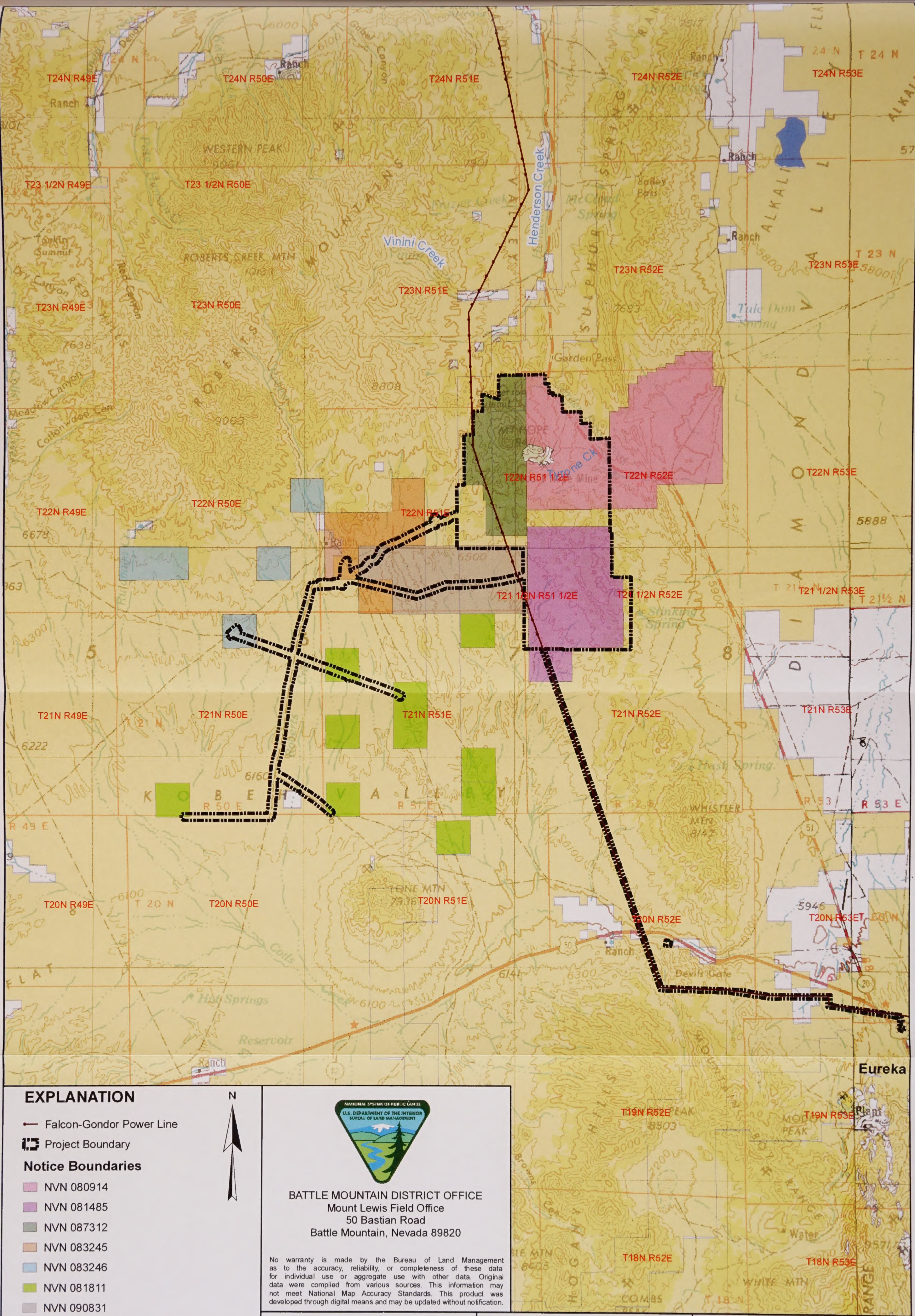
DESIGN: EMLLC
DRAWN: BVB/GSL
REVIEWED: VS/RFD
SCALE:
DATE: 8/11/2011
FILE NAME: p1635_Fig1-1-1_GeneralLocationMap.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

General Location Map

Figure 1.1.1



T24N R49E
T24N R50E
T24N R51E
T24N R52E
T24N R53E
T23 1/2N R49E
T23 1/2N R50E
T23N R49E
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T18N R53E
WESTERN PEAK
ROBERTS CREEK MTN
ROBERTS MOUNTAINS
Vinini Creek
Henderson Creek
Tonkin Summit
Red Canyon
Meadow Canyon
Cottonwood Can
Garden Pass
Bailey Pass
McCulloch Spring
SULPHUR SPRING RANGE
Tyrone Ck
Mine
ALKALI
Tule Dam Spring
DIAMOND VALLEY
Stinking Spring
KOBEH VALLEY
WHISTLER MTN
LONE MTN
Devils Gate
Ranch
Hot Springs
Reservoir
FLAT
Eureka
MOD PEAK
HOGAN HILLS
Browns Can
WHITE MTN
RANGE

EXPLANATION

N

- Falcon-Gondor Power Line
- Project Boundary

Notice Boundaries

- 🟪 NVN 080914
- 🟪 NVN 081485
- 🟩 NVN 087312
- 🟫 NVN 083245
- 🟦 NVN 083246
- 🟩 NVN 081811
- ⬜ NVN 090831

Land Status

- 🟨 Public Land
- ⬜ Private Land
- 🟦 Water

NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

0 1 2 3 4 5 Miles

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Project Area and Land Ownership

Figure 1.1.2

DESIGN: EMLLC
DRAWN: CVD/GSL
REVIEWED: RFD
CHECKED: -
APPROVED: RFD
DATE: 08/15/2012
FILE NAME: p1635_Fig1-1-2_ProjectArea&LandOwnership_v3.mxd

no vegetative cover. Scattered vegetation, consisting primarily of sagebrush, is present on the remaining two tailings impoundments, which measure approximately 250 feet by 175 feet and 400 feet by 150 feet.

All three tailings impoundments range in depth from less than three feet to approximately 16 feet. The overflow tailings containment impoundment measures approximately seven feet by 16 feet and is located southwest of the former mill. This impoundment was utilized to contain any spills from the mill and is currently estimated to contain approximately two yd^3 of material. The center of the impoundment is void of vegetation; however, the edges of the impoundment contain sparse vegetation. The tailings were characterized in 1995 (Westec 1995) using the Meteoric Water Mobility Procedure (MWMP) to determine whether or not the contained constituents were mobile. The preliminary investigation indicated that the tailings material did not have the potential to degrade the waters of the State of Nevada.

1.3 Existing Activities and Facilities

EML is presently conducting activities under Notices within the Project Area. These activities include condemnation drilling (i.e., drilling to confirm that no valuable minerals occur in the area drilled), installation of water quality monitoring wells to determine hydrogeochemical properties for studies used in the development of the Plan, and collection of information on geotechnical conditions underneath the proposed waste rock storage areas and tailings impoundments. EML also has Notices outside the Project boundary that are associated with water supply exploration activities. All Notices within and outside the Project Area are shown on Figure 1.1.2 and in Table 1.3-1. Notice NVN-087312 is located completely within the Plan boundary and would be retired upon Plan approval. All other Notices would remain open, although the disturbance associated with these individual Notices would be decreased due to a portion of them being subsumed by the Plan. These Notices are presently active and may be used to conduct additional exploration between the present time and the acceptance of the Plan. The remaining disturbance associated with Notices partially subsumed by the Plan would be determined and provided by EML as modification to the respective Notices once the Plan is approved. The disturbance associated with these Notices that remains within the Plan boundary would be bonded within the 50 acres of exploration disturbance provided.

Table 1.3-1: Legal Description of Notices Held by EML

Serial Number	Surface Disturbance (acres)*	Township, Range
NVN-080914	5	22N, 51E; 22N, 52E
NVN-081485	5	21N, 52E
NVN-081811	5	20N, 51E
NVN-087312	5	22N, 51E; 22N, 52E
NVN-083245	5	22N, 51E
NVN-083246	5	21N, 50E; 22N, 50E
NVN-090831	**5**	**22N, 51E; 21.5N, 51E**

*A conservative estimate of five acres per Notice is assumed.

EML controls the private land associated with previous mining activities. Cultural resource surveys of the Project Area were conducted during 2006, 2007, and 2008 to identify features that may be eligible for the National Register of Historic Places (NRHP) (Malinky 2006; Malinky 2008; Malinky et al. 2008).

1.4 Purpose of and Need for the Action

The BLM is responsible for administering mineral rights access on certain federal lands as authorized by the General Mining Law of 1872. Under the law, qualified prospectors are entitled to reasonable access to mineral deposits on public domain lands, which have not been withdrawn from mineral entry.

Under the FLPMA, the BLM is authorized to issue ROWs on public lands. Under this law, and the implementing regulations at 43 CFR 2800, qualified individuals can obtain ROWs on public lands.

The purpose of the Project is to profitably extract molybdenite from public lands where EML holds mining claims and private land to the optimal extent possible. **The Project need is to meet the prevailing market demand for molybdenum (Mo). The prevailing market demand is regularly adjusted at market exchanges throughout the world. This adjustment results from buyers and sellers agreeing on a specific transaction price, which reflects the current supply and demand for the commodity and other factors.**

The purpose and need for the federal action is multifold. One aspect of the purpose and need is established by the BLM's responsibilities under the FLPMA to respond to a request for a Plan of Operations for the applicant to exercise their rights under the General Mining Law, and an application for a ROW under FLPMA. Other aspects of the purpose and need of the federal action are: (1) to further the "Minerals" objective of the applicable resource management plan, which is to "[m]ake available and encourage development of mineral resources to meet national, regional, and local needs consistent with national objectives for an adequate supply of minerals"; and (2) to provide for mining and reclamation of the Project Area in a manner that is environmentally responsible and in compliance with federal mining laws, the FLPMA, Nevada Mine Reclamation Law, and other applicable laws and regulations.

1.5 BLM Responsibilities and Relationship to Planning

The BLM has the responsibility and authority to manage the surface and subsurface resources on public lands located within the jurisdiction of the MLFO. The public lands within the Project Area are designated as open for mineral exploration and development. This **Final** EIS was prepared in conformance with the policy guidance provided in BLM's NEPA Handbook (BLM Handbook H-1790-1) (BLM 2008a). The BLM Handbook provides instructions for compliance with the CEQ regulations (40 CFR 1500) for implementing the procedural provisions of the NEPA and United States (U.S.) Department of the Interior's (USDOI's) manual on NEPA (516 DM 1-7).

1.5.1 Resource Management Plan

The Proposed Action conforms with the BLM's Shoshone-Eureka Resource Management Plan (RMP), as amended, dated March 1986 (BLM 1986a). Specifically, on page 29 in the RMP Record of Decision (ROD), under the heading "Minerals" subtitled "Objectives" number 1:

> "Make available and encourage development of mineral resources to meet national, regional, and local needs consistent with national objectives for an adequate supply of minerals."

Under "Management Decisions," "Locatable Materials," page 29, number 1:

> "All public lands in the planning areas will be open for mining and prospecting unless withdrawn or restricted from mineral entry."

Under "Management Decisions," number 5, Current Mineral Production Areas:

> "Recognize these areas as having a highest and best use for mineral production and encourage mining with minimum environmental disturbance..."

1.5.2 Surface Management Authorizations and Relevant Plans

BLM regulations for surface management of public lands mined under the General Mining Law of 1872, as amended (43 CFR 3809) recognize the statutory right of mineral claim holders, such as EML, to explore for and develop federal mineral resources and encourage such development. These federal regulations require the BLM to review proposed operations to ensure that the following items are included: a) adequate provisions to prevent unnecessary or undue degradation of public lands; b) measures to provide for reclamation; and c) operations comply with other applicable federal, state, and local laws and regulations. EML submitted a Plan for the Project to the BLM in June 2006, revised September 2006, June 2007, May 2008, June 2008, July 2008, January 2009, October 2009, January 2010, July 2010, January 2011, July 2011**, and July 2012** (EML 2006) as required under the regulations. The EML Plan is on file and available for review during normal business hours at the BLM's MLFO.

The General Mining Law of 1872 allows individuals to locate and patent mining claims, such as lode claims. Since 1994, Congress has maintained a moratorium on BLM processing of mineral patent applications. Under the mill site provision, 30 U.S. Code (U.S.C.) 42, no location of a claim on nonmineral lands, called mill sites, may exceed five acres each. Under 43 CFR Sec. 3832.32, the maximum size of an individual mill site is five acres; however, more than one mill site per mining claim can be located if each site is used for at least one of the purposes described in 43 CFR Sec. 3832.34. The amount of located mill site acreage is that which is reasonably required for use or to be occupied for efficient and reasonably compact mining or milling operations.

The FLPMA **[43 U.S.C. 1761]** allows individuals to use public lands for powerlines, as well as other linear features (roads, pipeline, etc.), through the issuance of a ROW by the BLM.

1.5.3 Site Reclamation Requirements

The Mining and Mineral Policy Act of 1970 (MMPA) mandates federal agencies to ensure that closure and reclamation of mine operations are completed in an environmentally responsible manner. The MMPA states that the federal government should promote the following:

> "...development of methods for the disposal, control, and reclamation of mineral waste products, and the reclamation of mined lands, so as to lessen any adverse impact of mineral extraction and processing upon the physical environment that may result from mining or mineral activities."

The BLM's long-term reclamation goals are to shape, stabilize, revegetate, or otherwise treat disturbed areas in order to provide a self sustaining, safe, and stable condition providing productive use of the land, which conforms to the approved land use plan for the area. The BLM's long-term goals also include management of any discharges from process components. The short-term reclamation goals are to stabilize disturbed areas and to protect both disturbed and adjacent undisturbed areas from unnecessary or undue degradation. Relevant BLM policy and standards for reclamation are set forth in the BLM Solid Minerals Reclamation Handbook (BLM Manual Handbook H-3042-1), which provides consistent reclamation guidelines for all solid non-coal mineral activities conducted under the authority of the BLM Minerals Regulations in Title 43 CFR 3809 (BLM 1992). The BLM has reviewed the site reclamation portions of the Plan to ensure that the Project would meet BLM reclamation standards and goals. The Project would also be required to obtain a reclamation permit from, and meet the reclamation standards of, the State of Nevada Department of Conservation and Natural Resources, Nevada Division of Environmental Protection (NDEP), Bureau of Mining Regulation and Reclamation (BMRR).

1.5.4 Local Land Use Planning and Policy

The Eureka County 1973 Master Plan, updated in 2000 and again in 2010, contains a description of land uses, restrictions on development, and recommendations for future land use planning. The Eureka County Master Plan 2010 included an Economic Development Element which incorporated recommendations for increased land use planning that expands and diversifies the County's economy. The Natural Resources and Federal or State Land Use Element was developed and included into the **Master** Plan in response to Nevada Senate Bill **(SB)** 40, which was passed in 1983, which directs counties to develop plans and strategies for resources that occur within lands managed by federal and state agencies. Policies within the Eureka County Master Plan promote the expansion of mining operations/areas. **Some elements of the Proposed Action would be in conformance with Eureka County plans and policies while other elements of the proposed mine could prove inconsistent with these plans and policies. Appendix A outlines these inconsistencies between the Project and the Eureka County Master Plan. The BLM acknowledges that EML would have to comply with any applicable Eureka County codes.**

The Natural Resources and Federal or State Land Use Element is an executable policy for natural resource management and land use on federal and state administered lands in Eureka County. This element is designed to accomplish the following: 1) protect the human and natural environment of Eureka County; 2) facilitate federal agency efforts to resolve inconsistencies between federal land use decisions and County policy; 3) enable federal and state agency officials to coordinate their efforts with Eureka County; and 4) provide strategies, procedures, and policies for progressive land and resource management (Eureka County 2010).

1.6 Authorizing Actions

Scoping process information and subsequent discussions with various agencies have identified certain authorizing actions as required, or potentially required, prior to construction or operation of the Project. A list of these authorizing actions organized by agency is provided in Table 1.6-1.

Table 1.6-1: Summary of Environmental Permits and Approvals Required for the Project

Permit/Approval	Granting Agency	Permit Number	Date Issued	Status
Plan of Operations	USDOI, BLM	**n/a**	**n/a**	**Revised Plan of Operations submitted July 2012.**
Reclamation Bond Determination	USDOI, BLM and Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Mining Regulation and Reclamation	**n/a**	**n/a**	**Revised Reclamation Plan, reclamation cost estimate, and permit application submitted July 2012.**
Right-of-Way	USDOI, BLM	**n/a**	**n/a**	**Revised Plan of Development and application for ROW grant submitted July 2012.**
Utility Environmental Protection Act Permit	Nevada Public Utilities Commission	**n/a**	**n/a**	**Application submitted to Nevada Public Utilities Commission in February 2008 and assigned Docket # 08-01016).**
Permit to Operate (Air Quality)	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Pollution Control	**AP 1061-2469**	**May 29, 2012**	**n/a**

Permit/Approval	Granting Agency	Permit Number	Date Issued	Status
Water Pollution Control Permit	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Mining Regulation and Reclamation	**NEV 2008106**	**n/a**	**Draft permit released for internal review in June 2012.**
Permit for Reclamation	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Mining Regulation and Reclamation	**n/a**	**n/a**	**Revised Reclamation Plan, reclamation cost estimate, and permit application submitted July 2012.**
Permit to Appropriate Water	Nevada Department of Conservation and Natural Resources, Division of Water Resources	**Numerous permit numbers**	**Nevada State Engineer Ruling #6127 issued June 15, 2011.**	**n/a**
Industrial Artificial Pond Permits	Nevada Department of Wildlife	**n/a**	**n/a**	**Need for permit pending a NDOW determination of the potential for tailings water to be toxic to wildlife.**
Solid Waste Class III Landfill Waiver	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Waste Management	**n/a**	**n/a**	**Application submitted in August 2012.**
Septic Treatment Permit	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Pollution Control	**n/a**	**n/a**	**Application would be developed as infrastructure design is finalized and issuance of ROD allows site disturbance to conduct percolation tests.**
Drinking Water Supply	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Safe Drinking Water	**n/a**	**n/a**	**Application to be submitted upon completion of potable water system design in late 2012.**

Permit/Approval	Granting Agency	Permit Number	Date Issued	Status
General Discharge Permit (Storm Water)	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Pollution Control	**n/a**	**n/a**	**An extension of the previous approval of the jurisdictional survey conducted in 2007 would negate the need for this permit due to the absence of Waters of the U.S.**
Powerline Rerouting (Right-of-Way Amendment)	USDOI, BLM	**n/a**	**n/a**	**This permit would not be necessary until Year 34 of the Project.**
Explosive Permit	Bureau of Alcohol, Tobacco, Firearms, Explosives	**n/a**	**n/a**	**Permit application was submitted in June 2012.**
Hazardous Materials Storage Permit	State of Nevada, Fire Marshal Division	**n/a**	**n/a**	**Permit application would be developed after details of material storage are finalized, anticipated in late 2013.**
Hazardous Waste Identification Number	U.S. Environmental Protection Agency	**Generator ID # NVR000081349**	**July 18, 2006**	**n/a**
Encroachment Permit	Nevada Department of Transportation, District III	**n/a**	**n/a**	**Permit application to be developed after design of additional safety lanes is completed, anticipated to be in 2012.**
Liquefied Petroleum Gas License	Nevada Board of the Regulation of Liquefied Petroleum Gas	**n/a**	**n/a**	**Permit application would be developed after ROD issuance to allow site surface disturbance to complete compaction tests.**
Radioactive Material License[1]	Nevada Bureau of Health Protection Services	**n/a**	**n/a**	**Permit application would be developed after selection of specific sensors to be used in the process, anticipated to be in 2013.**
Permit to Construct Tailings Impoundments	Nevada Department of Conservation and Natural Resources, Division of Water Resources	**J-623 and J-653**	**October 25, 2010**	**n/a**

Permit/Approval	Granting Agency	Permit Number	Date Issued	Status
Permit to Operate	Nevada State Minerals Commission, Division of Minerals	**n/a**	**n/a**	**Registration is required within 30 days of the start of operations, after which the Permit to Operate would be issued.**

[1] A radioactive material license may be required if nuclear flow and mass measuring devices are used in the mill and ore reclaim tunnels.

1.7 Environmental Review Process

A Project Scoping Summary documents activities conducted during the scoping process. The summary addresses the issues and concerns identified by the public during the scoping process. The Scoping Summary outlines the key issues identified during scoping and that the BLM deems to be necessary for analysis in the EIS, as well as those concerns not considered critical effects of the Proposed Action. The Scoping Summary is on file and available for review during normal business hours at the BLM's MLFO.

A Notice of Intent (NOI) to prepare this EIS was published in the Federal Register (FR) on March 2, 2007. The NOI invited scoping comments to be sent to the BLM through April 6, 2007. Also on March 2, 2007, copies of a news release entitled "Notice of Intent to Prepare an Environmental Impact Statement to Analyze the Proposed Action for the Mount Hope Project" were submitted to three northern Nevada newspapers (Humboldt Sun in Winnemucca, Battle Mountain Bugle in Battle Mountain, and the Elko Daily Free Press in Elko, Nevada) and to major interest groups. Public scoping meetings for the Project were held on March 27, 2007, and March 28, 2007.

The meeting on March 27, 2007, was held in Eureka, Nevada, at the Eureka Opera House. A total of five members of the public attended this meeting, and no written comments were received.

The meeting on March 28, 2007, was held in Battle Mountain, Nevada, at the BLM MLFO. A total of 30 members of the public attended this meeting, and one written comment was provided.

Five additional comment letters were received via mail or email during the public scoping period, and three letters were received in July 2007 after the close of the scoping comment period.

Comment letters received during and after the public scoping period have been included in the Scoping Summary and follow-up summaries, which are on file and available for review during normal business hours at the BLM's MLFO. As a result of the public scoping process, the following potential issues of concern were identified by the public:

- General Project Issues
  Scope of project
  Length of project

Size of project
Reclamation requirements
Financial guarantees
Mitigation measures
Long range plans
Protection of resources
Sustainability
Alternatives to the Project
Operational performance standards
Waste management
Cumulative impacts
Loss of ecosystem
Change in local microclimate
Land restoration

- Soils and Watershed Issues
  Impacts from increased erosion
  Impacts to soils from a chemical release (surface or air)
  Impacts to the quality of soils for restoring wildlife habitat and values

- Livestock Grazing and Production Issues
  Impacts to access for permittees
  Impacts to forage levels
  Impacts to grazing allotments
  Impacts to utilization levels
  Impacts to animal unit months

- Water Resource Issues
  Impacts to regional hydrology
  Impacts to surface waters from toxic effluents and residues
  Impacts to ground water chemistry
  Impacts from acid generation
  Impacts to seeps and springs
  Impacts from ground water pumping
  Impacts to future pit water quality
  Impacts from infiltration activities
  Impacts to stream flows/surface flows
  Impacts to wetlands
  Impacts to aquifer level
  Impacts of water in the pit during mining operations
  Impacts to waters of the U.S.
  Impact of ground water recharge following mine closure
  Impacts from sediment loads to streams
  Water quantity
  Use of Water
  Co-mingling of aquifers
  Impacts of catastrophic event on surface waters and ground water
  Maintenance of water lines

Impacts to water rights
Impacts to water quality
Impacts from water discharge
Impacts from mine drainage
Impacts to drainage patterns
Impacts from erosion and sedimentation
Impacts from flash floods
Flood plain recognition
Impacts from surface water, rain, or snow melt percolating through mine facilities

- Air Resource Issues
  Impacts to air quality
  Impact of mercury and other hazardous air pollutants emissions

- Wildlife and Fisheries Resource Issues
  Impacts to threatened and endangered species
  Impacts to terrestrial and aquatic wildlife and habitats
  Impacts to wildlife from hazardous materials and toxic solutions
  Impacts to breeding, nesting, and cover habitats of wildlife
  Impacts to wildlife diversity
  Impacts to native flora
  Impact of tailings facility on wildlife resources
  Impacts of pit water quality on wildlife
  Impacts to wildlife from Project-generated noise
  Reclamation impacts to wildlife
  Impact to riparian areas
  Wildlife access to water
  Impacts to wildlife from mining operations
  Impacts to hunting and wildlife viewing opportunities
  Impacts to wildlife forage areas
  Impacts to wildlife migration routes
  Impacts to springs utilized by wildlife
  Impact to bats and bat habitat

- Wild Horse Issues
  Impacts to wild horses from mining operations
  Impacts to wild horse foraging
  Impacts to wild horse management and allowable management levels
  Impacts to wild horse habitat and available acreages
  Impacts due to vehicular collisions with wild horses
  Impacts to herd management areas
  Impacts to free roaming behavior
  Impacts to wild horses due to water right transfers
  Impacts to water sources that wild horses use

- Cultural Resources and Native American Traditional Value Issues
  Impacts on Native American cultural sites
  Impacts on historic sites

Impacts on pine nut harvesting areas
Impacts to Native American Traditional Values

- Geology Issues
  Impacts of seismic activity on Project components
  Characterization of waste rock

- Visual Resource Issues
  Impacts to visual resources
  Impacts from lighting
  Impacts from color of facilities
  Impacts to line and form
  Impacts to the Pony Express Historic Trail

- Auditory Resource Issues
  Impacts from Project-related noise

- Land Use, Access, and Public Safety Issues
  Impacts to public safety
  Impacts to local traffic
  Impacts to access for the public

- Recreation and Wilderness Issues
  Impacts to wilderness resources
  Impacts of potential use of pit lake as a recreation site
  Impacts to recreation and hunting

- Socioeconomic Values and Public Services Issues
  Impacts to public services and infrastructure
  Impacts on economics in Eureka County
  Impacts on economics in State of Nevada
  Impacts from employee housing
  Impacts to the Town of Eureka

- Hazardous Material Issues
  Impacts from releases of hazardous materials

- Environmental Justice Issues
  Impacts to minority and low income populations

All of the above identified issues or concerns have been outlined in the Scoping Summary or the **Final** EIS. The scoping comments were reviewed for relevance to the Proposed Action, and those which addressed potential impacts of the Proposed Action have been included in the **Final** EIS.

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2 DESCRIPTION OF ALTERNATIVES, INCLUDING THE PROPOSED ACTION

2.1 Proposed Action

The Proposed Action consists of **four** connected actions. The first action includes those activities proposed in the Plan. The remaining actions are associated with the **three** ROW Applications and PODs.

The following discussion of the Proposed Action is a summary of the Plan (EML 2006) and ROW Application and POD (EML 2008a). The Plan, ROW Application, and POD contain substantial supporting information and details that supplement this Proposed Action. As required under Section 3809.401 of 43 CFR Subpart 3809, this additional information includes the following operating plans:

- Waste Rock Management Plan (WRMP) (Rock Characterization and Handling Plan) located in Appendix 4 of the Plan;
- Spill Contingency Plan located in Appendix 11 of the Plan;
- Quality Assurance Plan located in Appendix 6 of the Plan;
- Monitoring Plan located in Appendix 12 of the Plan;
- Interim Management Plan located in Appendix 8 of the Plan; and
- Water Management Plan as discussed in Section 3.D.19 of the Plan.

Should the reader require details beyond that which is presented in the Proposed Action, the Plan, ROW Application, and the POD are available for review at the MLFO in Battle Mountain, Nevada, during normal business hours.

The Project is located on public land administered by the BLM and on private land controlled by EML. The 80-year Project would have an 18- **to 24**-month construction phase, 44 years of mining and ore processing, 30 years of reclamation, and five years of post-closure monitoring. Concurrent reclamation would not commence until after the first 15 years of the Project. The Mount Hope ore body contains approximately 966 million tons of molybdenite (molybdenum disulfide) ore that would produce approximately 1.1 billion pounds of recoverable Mo during the ore processing time frame. Approximately 1.7 billion tons of waste rock would be produced by the end of the 32-year mine life. Approximately 1.0 billion tons of tailings would be produced by the end of the 44 years of ore processing. Optimal development of the Mo deposit, to meet the market conditions and maximize Mo production, would utilize an open pit mining method and would process the mined ore using a flotation and roasting process. The location of the WRDFs, the tailings storage facilities (TSFs), and the mill and roasting facilities adjacent to the open pit would be the most efficient location to meet the needs of the Project.

The Project would consist of the following:

a) An open pit with a life of approximately 32 years and associated pit dewatering;

b) WRDFs where waste rock would be segregated according to its potential to generate acid rock drainage (ARD);

c) Milling facilities including a crusher, conveyors, semi-autogenous grinding (SAG) and ball mills, flotation circuits, concentrate dewatering, ferric chloride concentrate leach circuit, and filtration and drying circuits that would operate for approximately 44 years;

d) A molybdenite concentrate roaster and packaging plant to package the technical grade molybdenum oxide (TMO) in bags, cans or drums;

e) A ferromolybdenum (FeMo) plant for production of FeMo alloy using a metallothermic process and separate packaging plant for drums and bags;

f) Two tailings storage facilities (South TSF and North TSF) and associated tails delivery and water reclaim systems;

g) An ongoing exploration program utilizing drilling equipment, roads, pads, and sumps;

h) Low-Grade Ore (LGO) Stockpile that would feed the mill after mining ceases;

i) Water supply development with associated wells, water delivery pipelines, access roads, and power in the Kobeh Valley Well Field Area;

j) **An approximately** 24-mile, 230-kV electric power supply line from the existing Machacek substation, with a substation and distribution system located in the Project Area;

k) A realigned section of the existing Falcon-Gondor powerline, which would require an amendment to the existing ROW at the time it is needed (near Year 36);

l) Ancillary facilities including haul, secondary, and exploration roads, a ready line (location of haulage equipment that is ready for use on a daily basis), warehouse and maintenance facilities, storm water diversions, sediment control basins, pipeline corridors, reagent and diesel storage, storage and laydown yards, ammonium nitrate silos, explosives magazines, fresh/fire suppression water storage and a process water storage pond, monitoring wells, an administration building, a security/first aid building, a helipad, a laboratory, growth media/cover stockpiles, borrow areas, mine power loop, communications equipment, hazardous waste management facilities, a Class III waivered landfill, and an area to store and treat petroleum contaminated soils;

m) Turn lane(s) on SR 278;

n) The option for the toll roasting of Mo from concentrate offsite; and

o) The closure of the TSF and the potentially acid generating (PAG) WRDF with the use of evapotranspiration **(ET)** cells to manage the long-term discharge from these facilities, as well as the physical reclamation of all Project components.

The surface disturbance associated with the proposed activities totals 8,355 acres and is outlined in Table 2.1-1.

Table 2.1-1: Proposed Action Surface Disturbance

Component	Public Acres	Private Acres	Total Acres
Open Pit	584	150	734
Waste Rock Disposal Facilities	2,246		2,246
Tailings Storage Facilities			3,276
North	879		
South	2,380		
Underdrain Ponds	17		
Low-grade Ore Stockpile[1]	384	33	417
Plant/Admin/Yards[2]	437	55	492
Power Supply Utility Corridor[3]	**122**	**2**	**124**
Access Road	9		9
Evapotranspiration (ET) Cells	38		38
Ancillary			1,019
Exploration	50		
Growth Media Stockpiles and Roads	488		
TSF Powerline Corridor	8		
Water Supply Development[4]	98		
Diversion Ditches[5]	113		
Interpit[6]	239	23	
Total	**8,092**	**263**	**8,355**

[1] May be incorporated into the PAG WRDF, depending on economics.

[2] Includes mill and maintenance buildings, crusher, conveyors, substations, vault, truck shop, warehouse, lab, roaster, yards, reclaim stockpile, laydown areas, fueling area, parking areas, fencing, and tailings and reclaim lines.

[3] Includes 22 acres under the Plan and **100** acres under the POD, which includes **two** acres of private land.

[4] Includes wells, water pipelines, electrical power, corridors, and associated access roads.

[5] Includes sediment control ponds around WRDFs and TSF diversion channels.

[6] **Surface area between the pit and the LGO stockpile and WRDFs.**

A list of anticipated mobile equipment requirements for the proposed mining operation is provided in Table 2.1-2. Vehicles and equipment may be upgraded over time as newer or more efficient technologies become developed. Other support vehicles and equipment may be used. In addition, at various times during the mine life, contract mining may be used to supplement the proposed equipment fleet, in which case equipment could be significantly different in size or number than what is listed in Table 2.1-2.

2.1.1 Open Pit Mining Methods

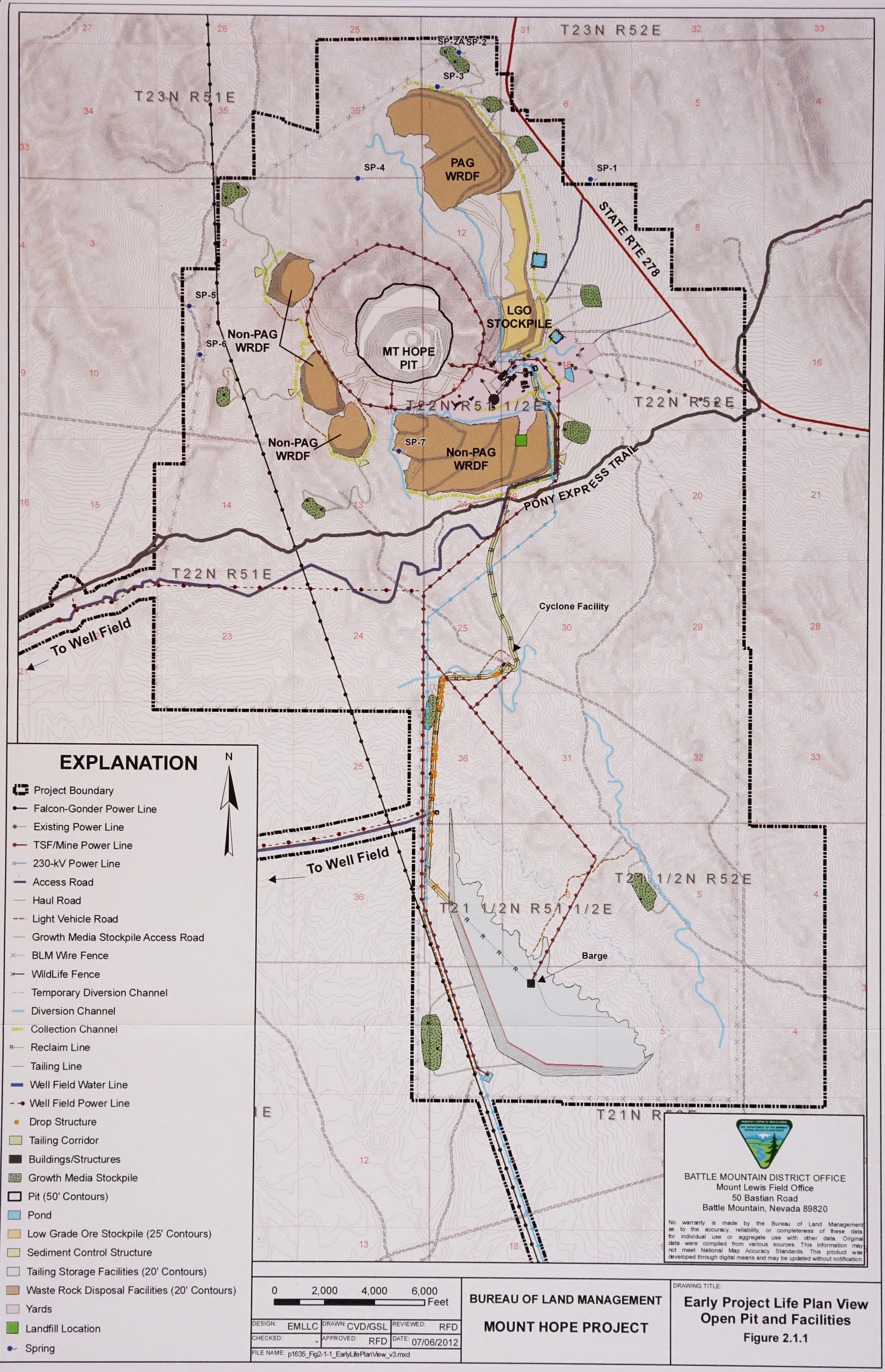
Approximately 2.7 billion tons of ore and waste rock would be excavated from the open pit and either placed in the WRDFs, sent to the mill, or stored in ore stockpiles for later processing at the mill. EML would operate the pit in a safe and practicable configuration that incorporates proper equipment operating room, working geometries, and access roads (Figures 2.1.1 and 2.1.3) to an ultimate open pit limit as shown on Figure 2.1.5. The mine plan employs a starter pit followed by a series of pushbacks which are lateral expansions of the pit by mining of the upper-most benches and then mining downward toward the pit floor. Multiple phases would be in operation at any point in time. Figures 2.1.1, 2.1.3, and 2.1.5 show the development of the open pit and associated facilities during early mining, middle of mining, and end of mining, respectively. Figures 2.1.2, 2.1.4, and 2.1.6 present open pit cross sections at each respective stage in the mine life. A single open pit would result from the phased mining. The ultimate pit depth would be approximately 2,600 feet below ground surface (bgs) at an elevation of approximately 4,700 feet above mean sea level (amsl). Pit backfill is not anticipated due to scheduling and resource evaluation; however, some in-pit waste rock disposal of non-acid generating material may be conducted. **This may be done as a temporary measure during development of the mine when mining and preparation of WRDFs are occurring simultaneously. At this time waste rock produced from the pit may be placed within the pit to allow continued pit development and later placement of this waste rock in the developed WRDF. Temporary placement of waste would not exceed 12 months. In addition, in-pit disposal may become economically preferable during the later stages of mine development when portions of the pit have been mined to the full design extent. Permanent placement of waste rock in the mined out areas would be limited to non-PAG waste rock.**

Table 2.1-2: Equipment Requirements for Project[1]

Unit	Peak Quantity During Production
Blasthole Drills	4
Shovels	4
Wheel Loaders	2
Haul Trucks	44
Wheel Dozers	3
Track Dozers	4
Track Excavator	1
Motor Graders	3
Water Trucks	3
Track Drill	1
Shovel Motivator	1

[1] The equipment types listed are general and intended only to provide an indication of the sizes and numbers that would be used; substitutions or additions may be made as necessary.

Conventional open pit mining (truck and shovel) would be used to extract ore and waste rock from the proposed open pit. Drilling and blasting would be used to break the rock so that it could be excavated. Blasting would utilize a mixture of ammonium nitrate and fuel oil (ANFO), although other explosives may be used during wet conditions. Blasting would be performed only during daylight hours and under strict safety procedures, as required by the Mine Safety and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T23N R51E
T22N R51 1/2E
T22N R52E
T22N R51E
T21 1/2N R52E
T21 1/2N R51 1/2E
T21N R52E
SP-2A SP-2
SP-3
SP-4
SP-1
SP-5
SP-6
SP-7
PAG WRDF
LGO STOCKPILE
MT HOPE PIT
Non-PAG WRDF
Non-PAG WRDF
Non-PAG WRDF
STATE RTE 278
PONY EXPRESS TRAIL
To Well Field
To Well Field
Cyclone Facility
Barge
EXPLANATION
N
Project Boundary
Falcon-Gonder Power Line
Existing Power Line
TSF/Mine Power Line
230-kV Power Line
Access Road
Haul Road
Light Vehicle Road
Growth Media Stockpile Access Road
BLM Wire Fence
WildLife Fence
Temporary Diversion Channel
Diversion Channel
Collection Channel
Reclaim Line
Tailing Line
Well Field Water Line
Well Field Power Line
Drop Structure
Tailing Corridor
Buildings/Structures
Growth Media Stockpile
Pit (50' Contours)
Pond
Low Grade Ore Stockpile (25' Contours)
Sediment Control Structure
Tailing Storage Facilities (20' Contours)
Waste Rock Disposal Facilities (20' Contours)
Yards
Landfill Location
Spring
0
2,000
4,000
6,000
Feet

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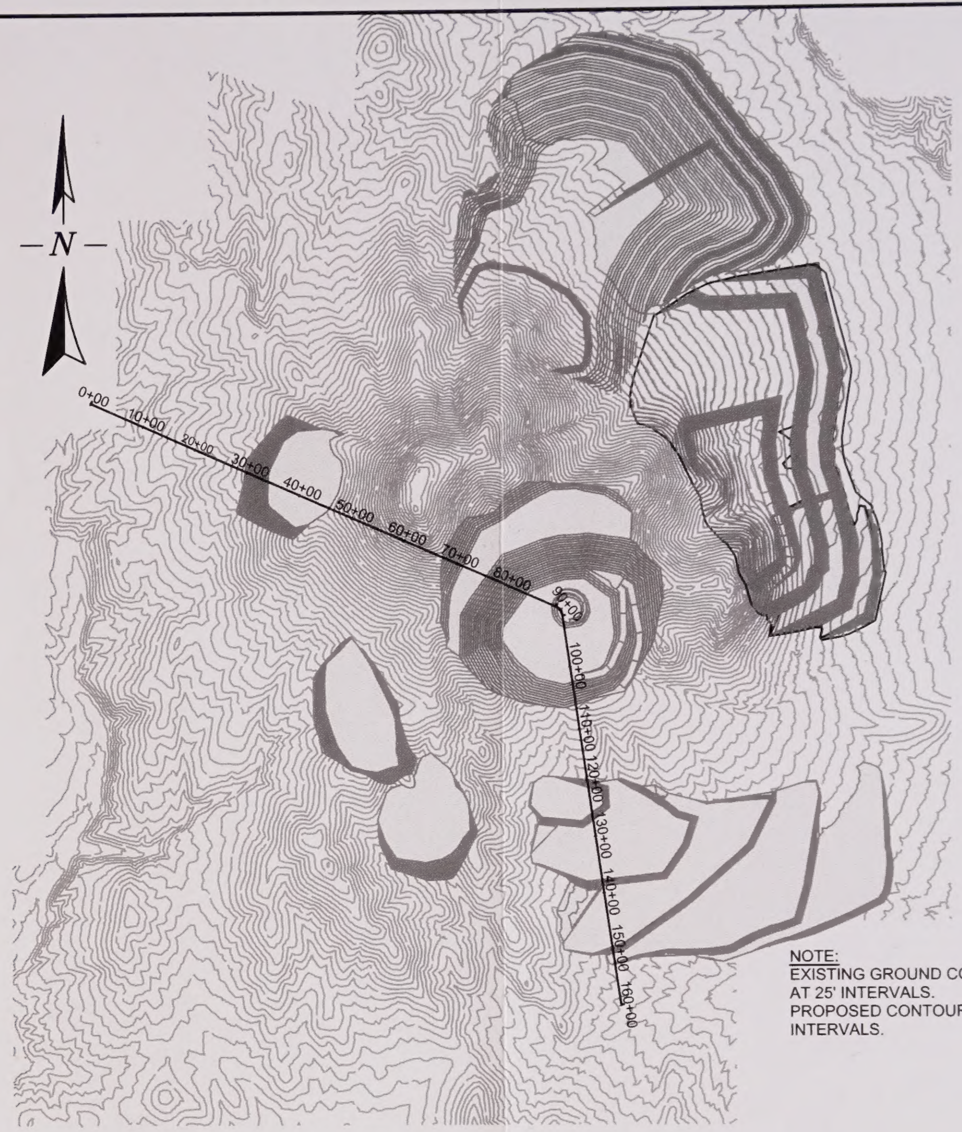
FILE NAME: p1635_Fig2-1-1_EarlyLifePlanView_v3.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Early Project Life Plan View
Open Pit and Facilities
Figure 2.1.1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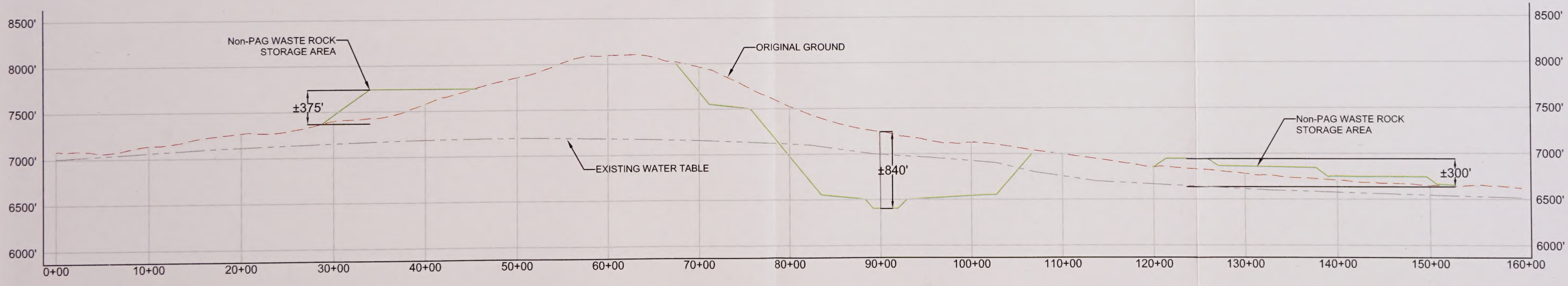
NOTE:
EXISTING GROUND CONTOURS ARE AT 25' INTERVALS.
PROPOSED CONTOURS ARE AT 20' INTERVALS.


8500'
8000'
7500'
7000'
6500'
6000'
Non-PAG WASTE ROCK STORAGE AREA
ORIGINAL GROUND
±375'
±840'
EXISTING WATER TABLE
Non-PAG WASTE ROCK STORAGE AREA
±300'
0+00
10+00
20+00
30+00
40+00
50+00
60+00
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100+00
110+00
120+00
130+00
140+00
150+00
160+00

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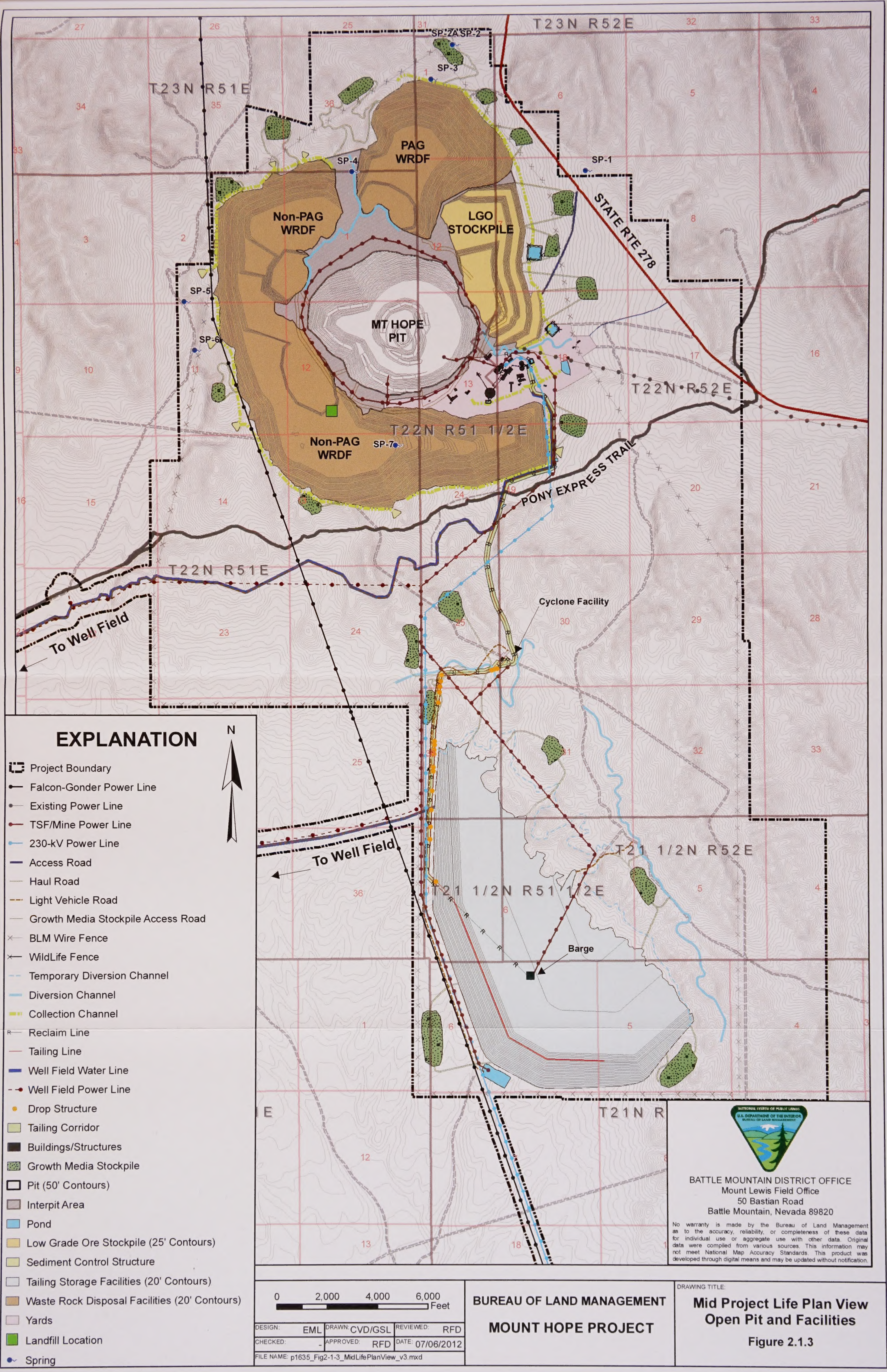
PROJECT NO. 1635	APPROVED: RFD	DATE: 04/26/2011
FILE NAME: p1635_Fig2-1-2&4&6_MineLifeCrossSections_v2.dwg		

Early Project Life Cross Secton through Open Pit

Figure 2.1.2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T23N R51E
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SP-3
SP-1
SP-4
SP-5
SP-6
SP-7
PAG WRDF
Non-PAG WRDF
LGO STOCKPILE
MT HOPE PIT
Non-PAG WRDF
STATE RTE 278
T22N R52E
T22N R51 1/2E
PONY EXPRESS TRAIL
T22N R51E
To Well Field
To Well Field
Cyclone Facility
T21 1/2N R52E
T21 1/2N R51 1/2E
Barge
T21N R
EXPLANATION
N
Project Boundary
Falcon-Gonder Power Line
Existing Power Line
TSF/Mine Power Line
230-kV Power Line
Access Road
Haul Road
Light Vehicle Road
Growth Media Stockpile Access Road
BLM Wire Fence
WildLife Fence
Temporary Diversion Channel
Diversion Channel
Collection Channel
Reclaim Line
Tailing Line
Well Field Water Line
Well Field Power Line
Drop Structure
Tailing Corridor
Buildings/Structures
Growth Media Stockpile
Pit (50' Contours)
Interpit Area
Pond
Low Grade Ore Stockpile (25' Contours)
Sediment Control Structure
Tailing Storage Facilities (20' Contours)
Waste Rock Disposal Facilities (20' Contours)
Yards
Landfill Location
Spring
0 2,000 4,000 6,000 Feet

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FILE NAME: p1635_Fig2-1-3_MidLifePlanView_v3.mxd

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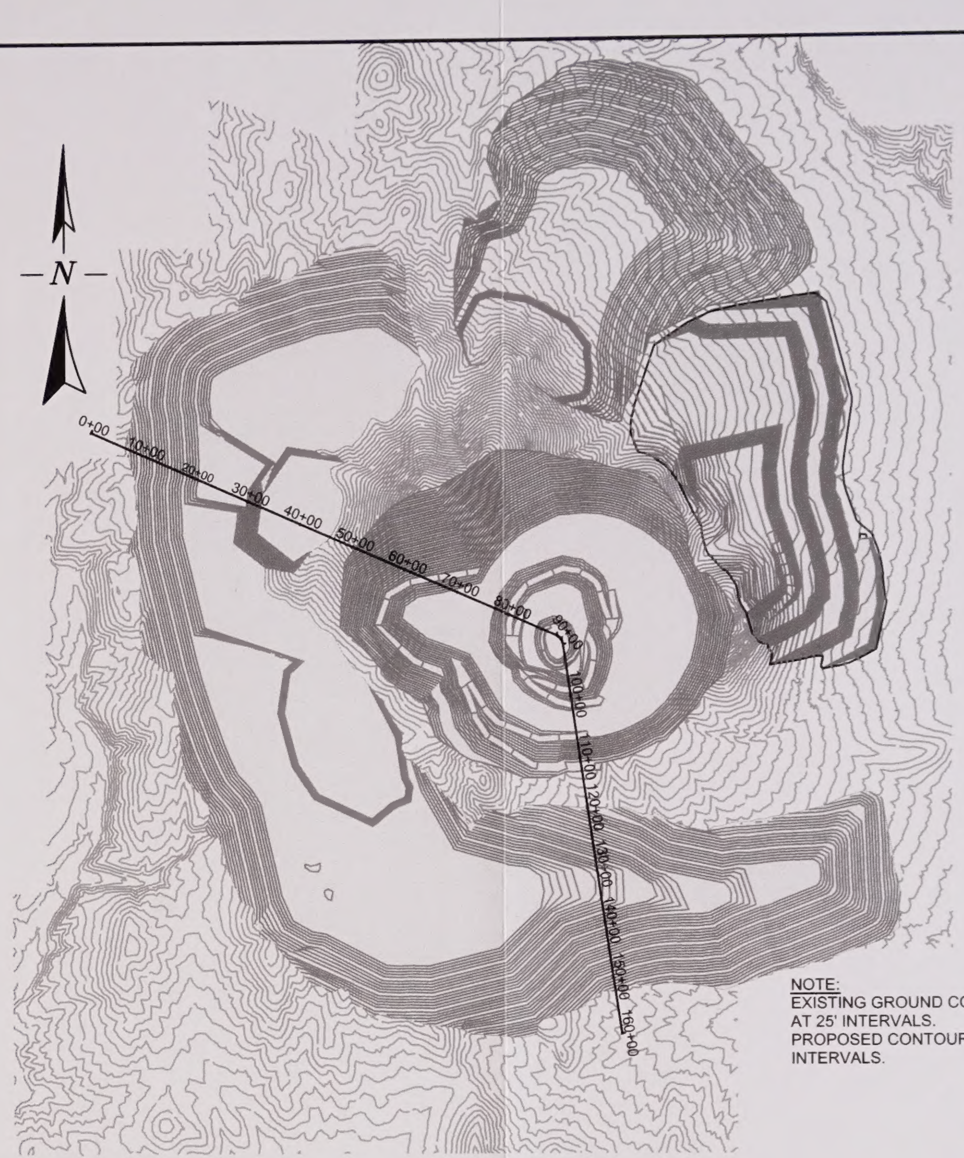
MOUNT HOPE PROJECT

DRAWING TITLE:

Mid Project Life Plan View
Open Pit and Facilities

Figure 2.1.3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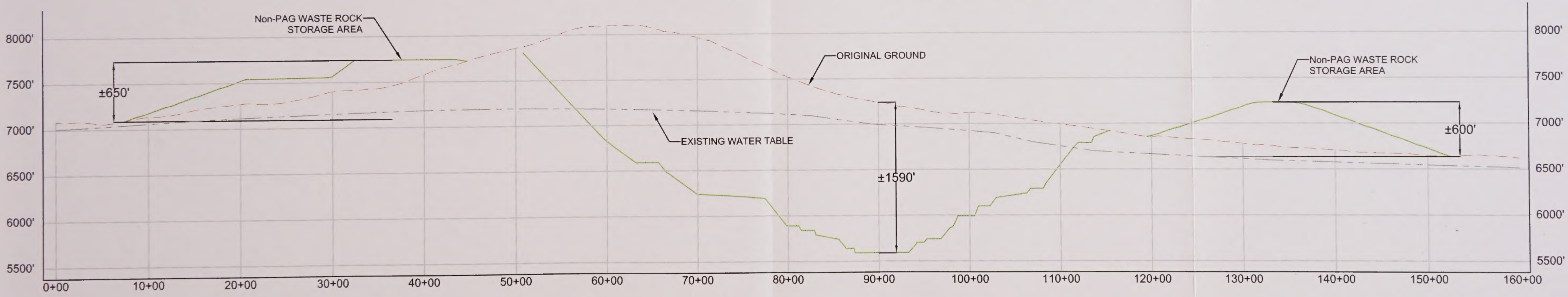
PROPOSED CONTOURS ARE AT 20' INTERVALS.


Non-PAG WASTE ROCK STORAGE AREA
ORIGINAL GROUND
Non-PAG WASTE ROCK STORAGE AREA
±650'
EXISTING WATER TABLE
±1590'
±600'
8000'
7500'
7000'
6500'
6000'
5500'
0+00
10+00
20+00
30+00
40+00
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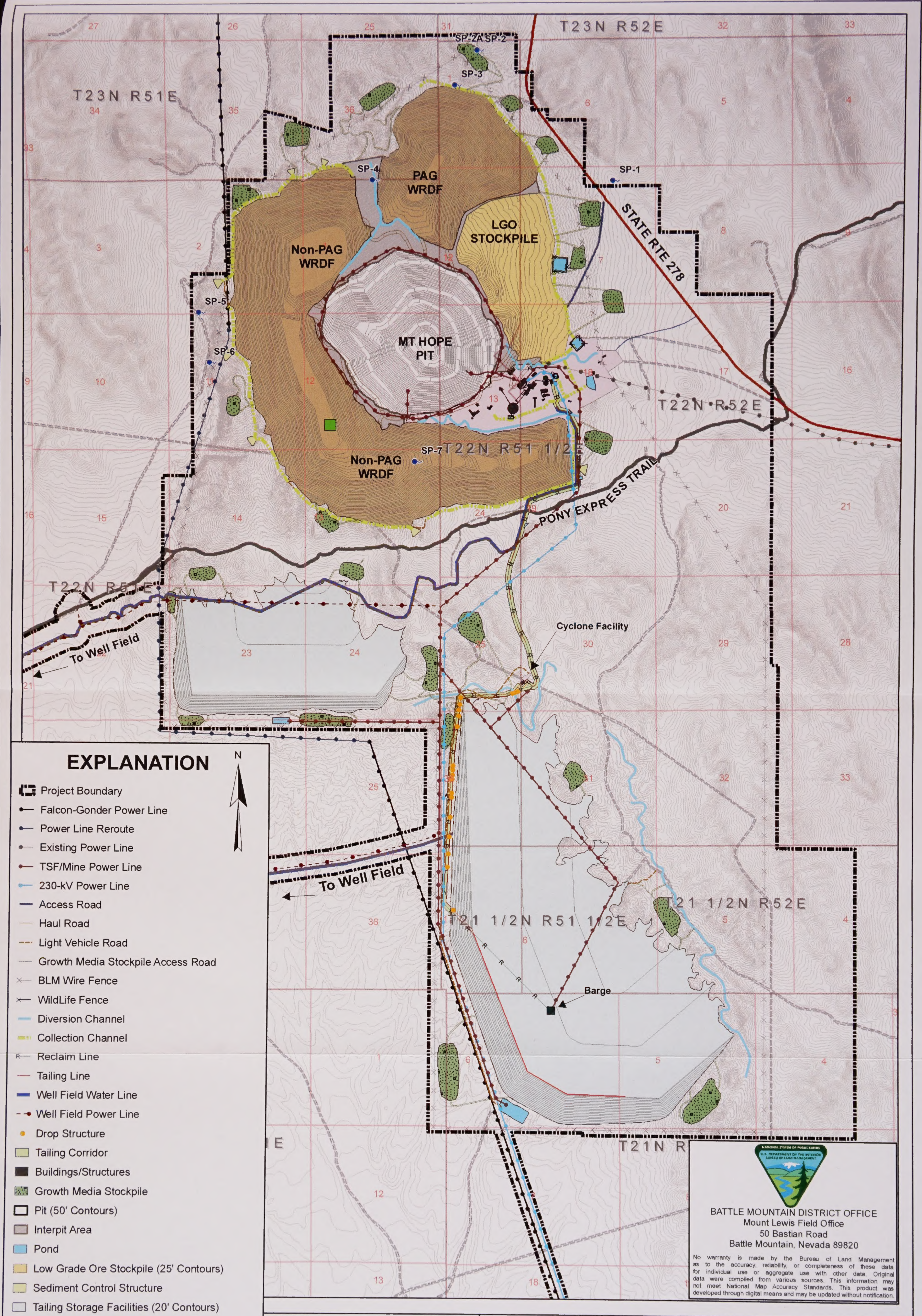
PROJECT NO. 1635	APPROVED: RFD	DATE: 04/26/2011
FILE NAME: p1635_Fig2-1-2&4&6_MineLifeCrossSections_v2.dwg		

Mid Project Life Cross Secton through Open Pit

Figure 2.1.4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SP-6
SP-7
PAG WRDF
LGO STOCKPILE
Non-PAG WRDF
MT HOPE PIT
Non-PAG WRDF
STATE RTE 278
PONY EXPRESS TRAIL
To Well Field
To Well Field
Cyclone Facility
Barge
EXPLANATION
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Project Boundary
Falcon-Gonder Power Line
Power Line Reroute
Existing Power Line
TSF/Mine Power Line
230-kV Power Line
Access Road
Haul Road
Light Vehicle Road
Growth Media Stockpile Access Road
BLM Wire Fence
WildLife Fence
Diversion Channel
Collection Channel
Reclaim Line
Tailing Line
Well Field Water Line
Well Field Power Line
Drop Structure
Tailing Corridor
Buildings/Structures
Growth Media Stockpile
Pit (50' Contours)
Interpit Area
Pond
Low Grade Ore Stockpile (25' Contours)
Sediment Control Structure
Tailing Storage Facilities (20' Contours)
Waste Rock Disposal Facilities (20' Contours)
Yards
Landfill Location
Spring
0 2,000 4,000 6,000 Feet

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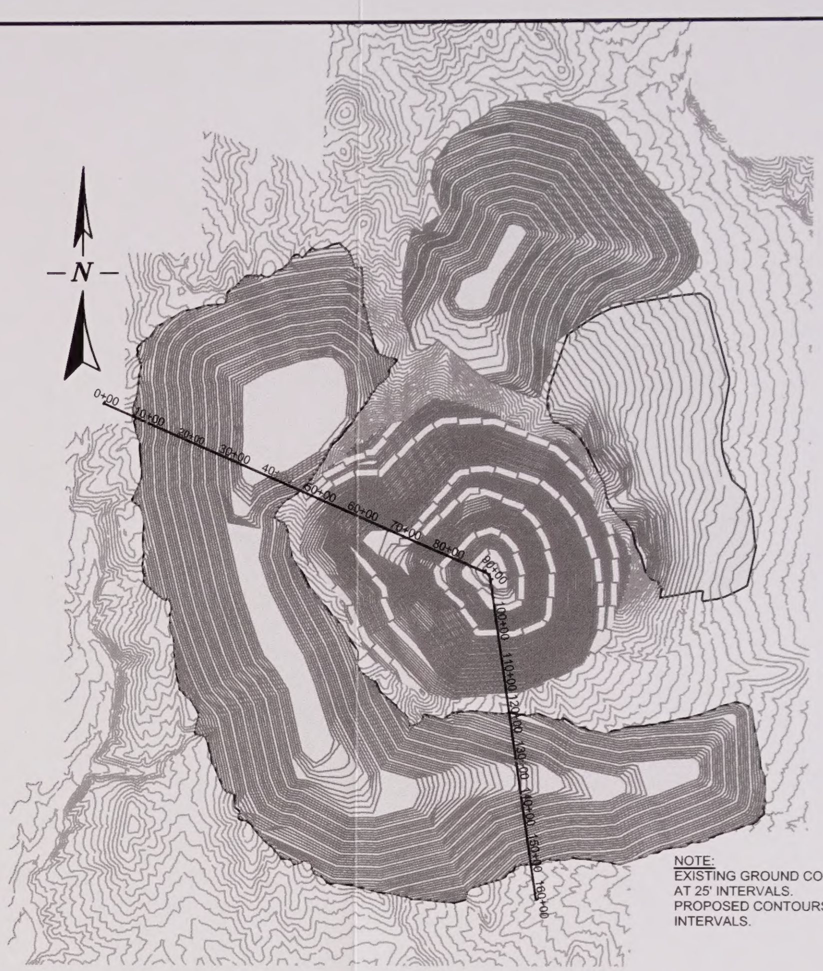
MOUNT HOPE PROJECT

DRAWING TITLE:

Late Project Life Plan View
Open Pit and Facilities

Figure 2.1.5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NOTE:
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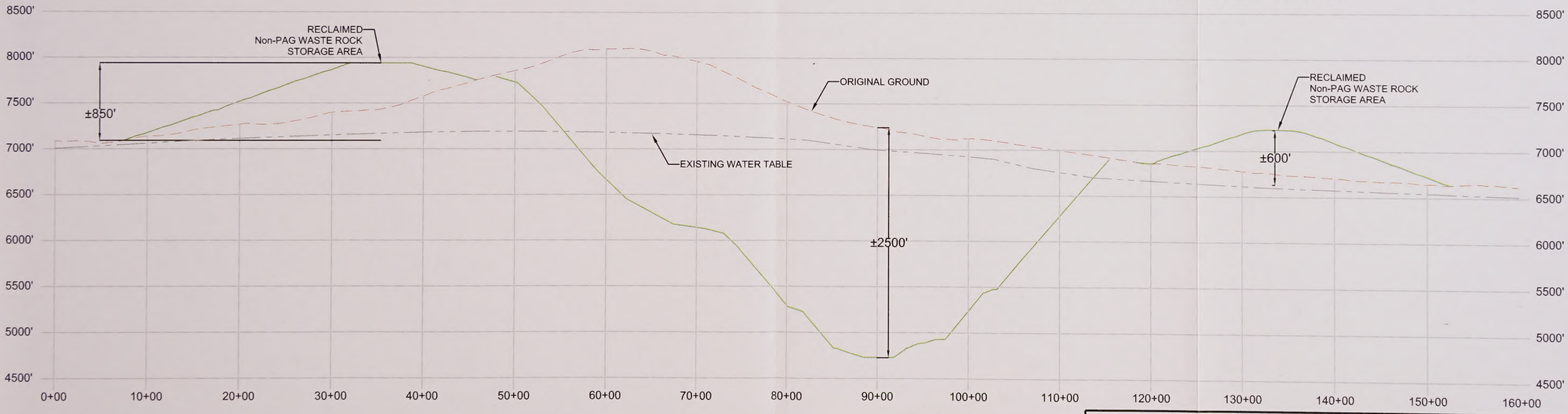
PROPOSED CONTOURS ARE AT 20' INTERVALS.


8500'
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6000'
5500'
5000'
4500'
RECLAIMED
Non-PAG WASTE ROCK
STORAGE AREA
±850'
ORIGINAL GROUND
EXISTING WATER TABLE
±2500'
RECLAIMED
Non-PAG WASTE ROCK
STORAGE AREA
±600'
0+00
10+00
20+00
30+00
40+00
50+00
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120+00
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140+00
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160+00

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MOUNT HOPE PROJECT

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Late Project Life Cross Secton through Open Pit

Figure 2.1.6

Health Administration (MSHA). Mill-grade ore would be loaded into haul trucks for transport to the primary crusher/conveyor system or high-grade stockpiles. LGO would be loaded into haul trucks for transport to the low-grade stockpile adjacent to the mill. Waste rock would be hauled to the WRDFs for permanent placement. Mining would be conducted 24 hours per day and seven days per week. The mining rate, ore and waste combined, would average 232,000 tons per day (tpd) over the life of the mine. The highest daily mining rates would be encountered during the first 25 years of production and would average approximately 265,000 tpd.

The angle of the open pit mine slopes would be influenced by rock strength, geologic structure, hydrology, pit wall orientation, and operational considerations. A stability analysis was conducted on a single (49 feet) and a double (98 feet) bench height vertical face geometric design to determine the combined impact of structurally controlled plane shear and wedge failures on the bench face. This analysis is presented in Appendix 2 of the Plan (EML 2006), which is on file and available for review at the BLM's MLFO during normal business hours. Based on this analysis, the pit wall slopes would range from 41 degrees (°) to 49° and average 45°, and the interramp slopes **(i.e., pit wall slopes in between benches)** would range from 45° to 53°. The catch bench widths would vary between approximately 45 feet and 66 feet (CNI 2005). The stability analysis relates to a 22-year mine plan at an ore mining rate of 44,100 tpd. Additionally, EML is committed to review slope stability predictions periodically during the mine life to increase the accuracy of slope stability predictions and to adjust pit designs based on actual mining experience. EML would submit a Plan modification to the BLM should a revision to the pit configuration be necessitated by the updated stability analysis.

2.1.2 Ground Water Management and Water Supply

The Project would require approximately 11,300 acre-feet per year (afy) (approximately 7,000 gallons per minute [gpm]) **of fresh** water supply during the life of the mill processing operation (44 years). Process water would be provided from five different sources: fresh water from the Kobeh Valley Well Field Area; reclaim water from the tailings storage facility; recycled water from the process facility; collected runoff water, including from the PAG WRDF and the LGO Stockpile; and produced water from mine dewatering. After the mill shuts down (Year 44), water demands would essentially become zero, although some water may be necessary for revegetation, domestic uses, or dust control during the reclamation phase of the Project.

2.1.2.1 Water Supply Development

All water used in the process would be routed through the process water tank. The level in the process water tank would control the water delivery rate from the well field. **Pumping from the wellfield would be reduced if water from other sources provided enough water for processing and other water requirements to allow for decreased pumping in the wellfield. Most of the fresh water would be ground water from the Kobeh Valley Wellfield. The fresh water requirement is 7,000 gpm. Most of the water (fresh and non-fresh) used in the project would be for processing Mo ore. Additional smaller amounts would be used for environmental controls (primarily for dust control and to operate the roaster's sulfur dioxide scrubber), potable, and sanitation. Fresh water would be required for some reagent solutions (associated with ore processing), environmental, potable, and sanitation. The rest of the fresh water would be used to "make-up" water requirements for ore processing. The remainder of the total processing requirement, comprising roughly two-thirds to three-**

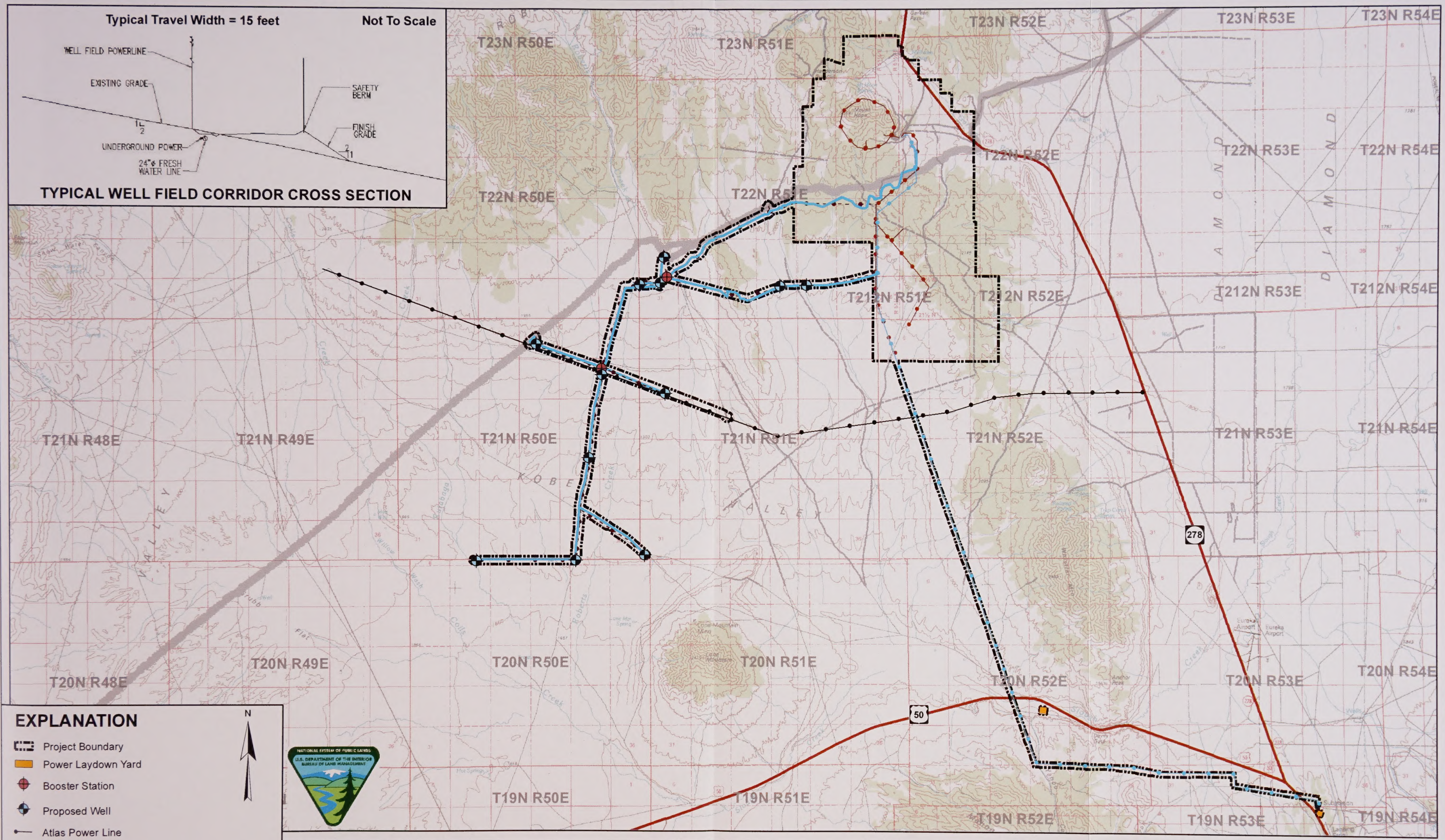
quarters of the total processing requirement, would not be fresh. Non-fresh water includes recycled process water and runoff. Fresh makeup water would be supplied primarily from water wells located in the Kobeh Valley Well Field Area, which would be located entirely within Kobeh Valley. Figure 2.1.7 illustrates, within the Kobeh Valley Well Field Area, the proposed locations of the wells, pipelines, access roads, and power, which consist of eight to 15 wells and two booster stations. It is anticipated that specific well locations may change over the life of this Project, but would be within the Kobeh Valley Well Field Corridor. Each well would be equipped with a pump. Fresh water from each well would be conveyed to a booster station. Water would be pumped to a secondary booster station and further to a one million gallon capacity fresh/fire suppression water tank which would be located at the mill site in the area designated as "Potable, Fresh, and Process Water Tanks" on Figure 2.1.8.

Figure 2.1.7 shows the locations of the initial well field and associated infrastructure. To provide the required fresh water for the Project over the 44-year period of ore processing, the location and number of wells may need to be adjusted within the development area. The primary source of water would be the alluvial aquifer with lesser amounts (no more than ten percent) derived from the carbonate aquifer.

This area is located within all or portions of the following: T20N, R50E; T21N, R50E; T21N, R51E; T22N, R50E; T21N, R51E; T22N, R51.5E; and T22N, R52E. Any change in the number of wells or the location of wells outside of the corridor shown on Figure 2.1.7 would be considered by the BLM MLFO as a modification of the Plan, which would be subject to an appropriate level of environmental review under the NEPA.

Water from the fresh/fire suppression water tank would be **distributed** to the fire suppression water circuit, the mine tank for use in dust control, the potable water circuit, process circuits in the mill facility that require fresh water, and to the gland seal water circuit (water injected at high pressure around a rotating shaft to form a water-tight seal to prevent leaks). Potable water would be supplied from the fresh/fire suppression water tank. Water quality is expected to meet drinking water standards (DWS) (Nevada Administrative Code [NAC] 445A.144). Water would gravity flow from the fresh/fire suppression water tank to the potable water tank with a capacity of approximately 10,000 gallons. EML would secure appropriate permits for the potable water system from the Nevada Bureau of Safe Drinking Water.

Two construction water wells would be located west of the South TSF in the corridor shown on Figure 2.1.7. These wells would supply construction water for the development of the earthen embankment at the South TSF and the main well field. Each well would be powered by a diesel generator; a 500 gallon diesel storage tank in containment would be located at each well. A standpipe would be located at each well to allow water trucks to be filled directly from the wells. The wells would be operated up to 24 hours per day and are projected to provide approximately 300 gpm each. A pipeline approximately ten inches in diameter would deliver water to the unlined earthen TSF Construction Pond. The pipeline would be buried in those areas where it crosses the two-mile buffer for greater sage-grouse (*Centrocercus urophasianus*) leks. This pond would be of sufficient volume to contain approximately one million gallons of water. This water would be used for construction activities, such as wetting the earthen embankment fill material and dust control. Construction water would be used at an average rate of about 300 gpm. A portable pump and standpipe delivery system would be located at the pond to fill water trucks.


Typical Travel Width = 15 feet
Not To Scale
WELL FIELD POWERLINE
EXISTING GRADE
SAFETY BERM
FINISH GRADE
UNDERGROUND POWER
24"ø FRESH WATER LINE
1
2
2
1
TYPICAL WELL FIELD CORRIDOR CROSS SECTION
T23N R50E
T23N R51E
T23N R52E
T23N R53E
T23N R54E
T22N R50E
T22N R51E
T22N R52E
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KOBE VALLEY
DIAMOND
DIAMOND
278
50
Eureka Airport

EXPLANATION

N

- ⬚ Project Boundary
- 🟧 Power Laydown Yard
- ⊕ Booster Station
- ⊕ Proposed Well
- •— Atlas Power Line
- •— TSF/Mine Power Line
- •— 230-kV Power Line
- -•- Power Line, Well Field Power Line
- — Well Field Water Line
- — Pony Express Trail

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0 1 2 3 4 5 6 7 Miles

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

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FILE NAME: p1635_Fig2-1-7_PowerlineROW&Wellfield_v2.mxd		

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Well Field and Powerline Routes

Figure 2.1.7

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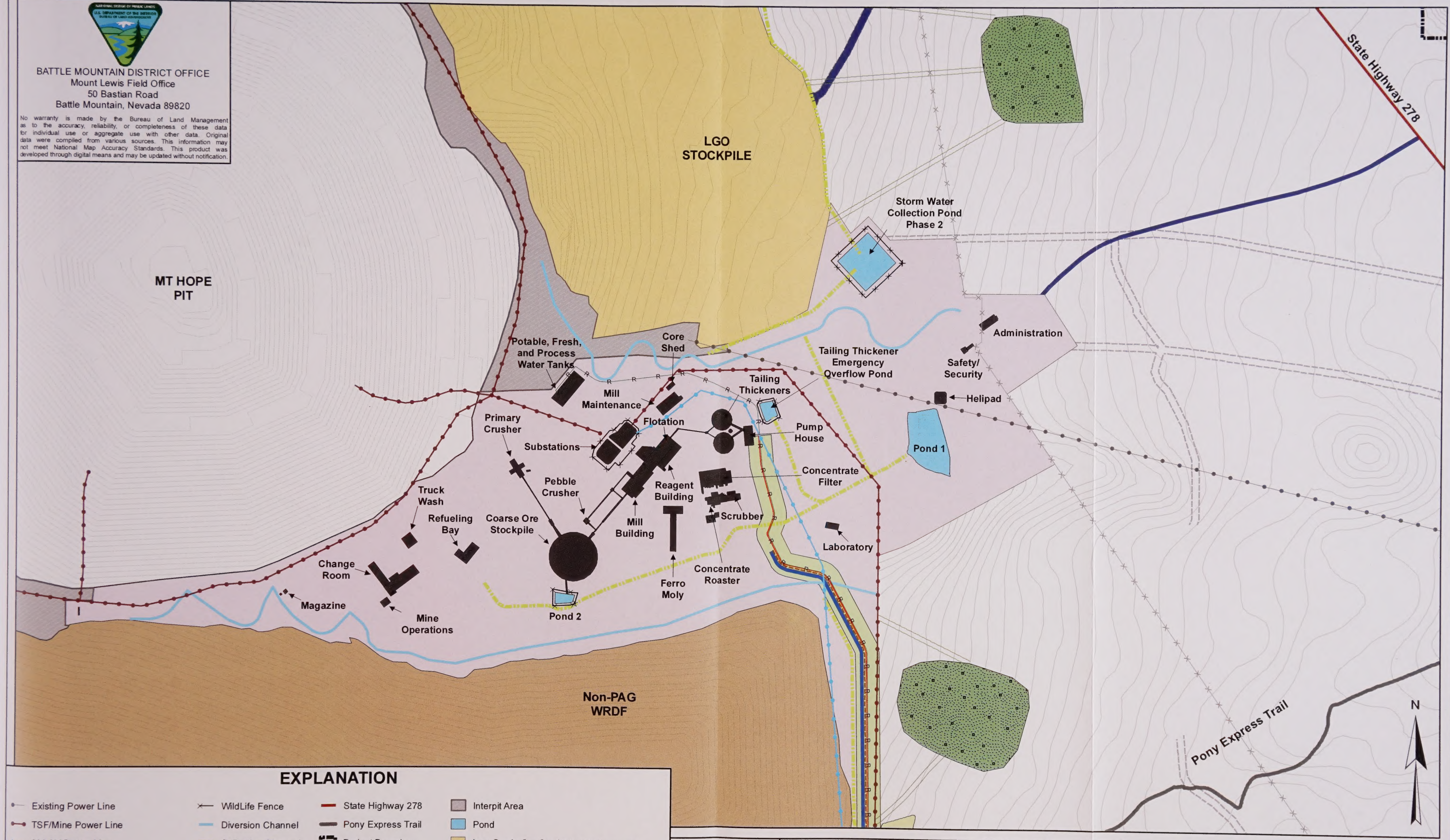

MT HOPE PIT
LGO STOCKPILE
Storm Water Collection Pond Phase 2
State Highway 278
Administration
Safety/ Security
Helipad
Tailing Thickener Emergency Overflow Pond
Core Shed
Potable, Fresh, and Process Water Tanks
Mill Maintenance
Tailing Thickeners
Flotation
Pump House
Pond 1
Primary Crusher
Substations
Concentrate Filter
Reagent Building
Pebble Crusher
Truck Wash
Refueling Bay
Coarse Ore Stockpile
Mill Building
Scrubber
Laboratory
Change Room
Concentrate Roaster
Ferro Moly
Magazine
Pond 2
Mine Operations
Non-PAG WRDF
Pony Express Trail
N

EXPLANATION

- Existing Power Line
- TSF/Mine Power Line
- 230-kV Power Line
- Access Road
- Light Vehicle Road
- Growth Media Stockpile Access Road
- BLM Wire Fence
- WildLife Fence
- Diversion Channel
- Collection Channel
- Reclaim Line
- Tailing Line
- Well Field Water Line
- Well Field Power Line
- State Highway 278
- Pony Express Trail
- Project Boundary
- Tailing Corridor
- Buildings/Structures
- Growth Media Stockpile
- Pit (50' Contours)
- Interpit Area
- Pond
- Low Grade Ore Stockpile (25' Contours)
- Sediment Control Structure
- Tailing Storage Facilities (20' Contours)
- Waste Rock Disposal Facilities (20' Contours)
- Yards

IF THE ABOVE BAR DOES NOT SCALE 1 INCH, THE DRAWING SCALE IS ALTERED

0 500 1,000 1,500 Feet

DESIGN: EML	DRAWN: JQG/GSL	REVIEWED: RFD
CHECKED: -	APPROVED: RFD	DATE: 05/04/2011
FILE NAME: p1635_Fig2-1-8_ConceptualPlantLayout_v2.mxd		

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Conceptual Plant Layout

Figure 2.1.8

The South TSF seepage collection pond would be constructed early in the construction schedule and would be available for additional water storage if construction water demand increased.

These two wells would be expected to be in continuous operation for approximately 12 months after which time the main well field would supply construction water on an as-needed basis. The wells, pipeline, and standpipe would be left in place following construction and may be used in the future for minor projects, dust suppression or other miscellaneous uses.

2.1.2.2 Mine Dewatering

Dewatering would be required during the mining phase of the Project, with the average pit inflow rate estimated to range between 60 to 460 gpm (100 to 750 afy) commencing in Year 1 of the Project. Mine dewatering is expected to last through Year 32 of the Project. Open pit dewatering would extract ground water from both the Kobeh Valley and Diamond Valley watersheds. Approximately 20 percent of the pit dewatering water would be from Kobeh Valley and 80 percent of the pit dewatering water would be from Diamond Valley, which is proportionally based on the configuration of the open pit relative to the basin divide and the local geology.

Active mine dewatering may not be initiated for several years as inflows during this period may be quite small. Dewatering would proceed throughout mining to ensure that mining would not be negatively affected by ground water inflows. Pit inflows would be managed by in-pit sumps excavated on an as-needed basis. If necessary, horizontal drains and perimeter wells would be utilized during mine operations. The volume of dewatering water would be expected to vary within different sectors of the open pit based on depth and geologic structures and units. The **dewatering water would be considered** "fresh water" **and would be** removed from the open pit **and** used in the mine and mill operations to offset **other** "fresh water" demands from the **production** well field.

2.1.3 Waste Rock Disposal Facilities

The Project would generate approximately 1.7 billion tons of waste rock that would occupy a total footprint of approximately 2,246 acres. Waste rock would be placed in two distinct WRDFs over the life of the mine, which would almost encircle the open pit (Figure 2.1.9). The PAG WRDF would ultimately contain approximately 0.5 billion tons of waste and the non-potentially acid generating (Non-PAG) WRDF approximately 1.3 billion tons. The WRDFs would be constructed in multiple lifts (Table 2.1-3), with typical heights of 100 feet, and setbacks between the lifts that would facilitate final grading to an interbench slope of 2.5 horizontal (H):1 vertical (V) or shallower with a 20-foot wide bench at the toe of each regraded lift. Due to the variations in the underlying topography and the variations in the final heights of the WRDF, there are a total of 11 lifts on the PAG WRDF and 16 lifts on the Non-PAG WRDF. The total height of the WRDFs would range from 750 feet to 950 feet (Table 2.1-3). Although the individual lifts for the PAG and Non-PAG WRDFs total 750 to 950 feet, the WRDFs would be built on sloping ground, and the lower lifts would not extend uphill far enough to lie directly below the upper lifts. The heights of the WRDFs are measured as the maximum thickness above natural topography, and are less than the sum of the individual lifts.

As outlined in Section 2.1.3.2, waste rock from the mining operation would be managed as either PAG waste rock or Non-PAG waste rock. The PAG WRDF would contain PAG materials, and the Non-PAG WRDF would contain Non-PAG materials. Figures 2.1.11, 2.1.12, and 2.1.13 present WRDF configurations at different times throughout the mine life. Figures 2.1.2, 2.1.4, and 2.1.6 present WRDF cross sections at various times during the mine life.

Table 2.1-3: Waste Rock Disposal Facilities Capacities and Height

WRDF Location	Capacity (billion tons)	Total Height (approximate feet)	Top Surface Elevation (approximate feet amsl)	Number of Lifts
PAG WRDF	0.45	700	7,550	11
Non-PAG WRDF	1.3	750-950	7,900	16

The open pit would be connected to the WRDFs by a series of haul road segments and the interpit area. As the WRDFs advance toward the open pit, the road segments being covered would be incorporated into the WRDFs. Design for the WRDFs has been developed on the basis of the geochemical and physical properties of the materials, foundation conditions at the dump sites, and the approximate volume of mine waste that would be produced.

An estimated 4.6 to 49 million tons of Non-PAG material and 2.6 to 29 million tons of PAG material would be extracted annually and placed in the WRDFs. The variation in the annual amounts would be due to the types of materials mined in a given year. This schedule would result in the delivery of approximately 0.5 billion tons of PAG material to the PAG WRDF and 1.3 billion tons of Non-PAG material to the Non-PAG WRDF.

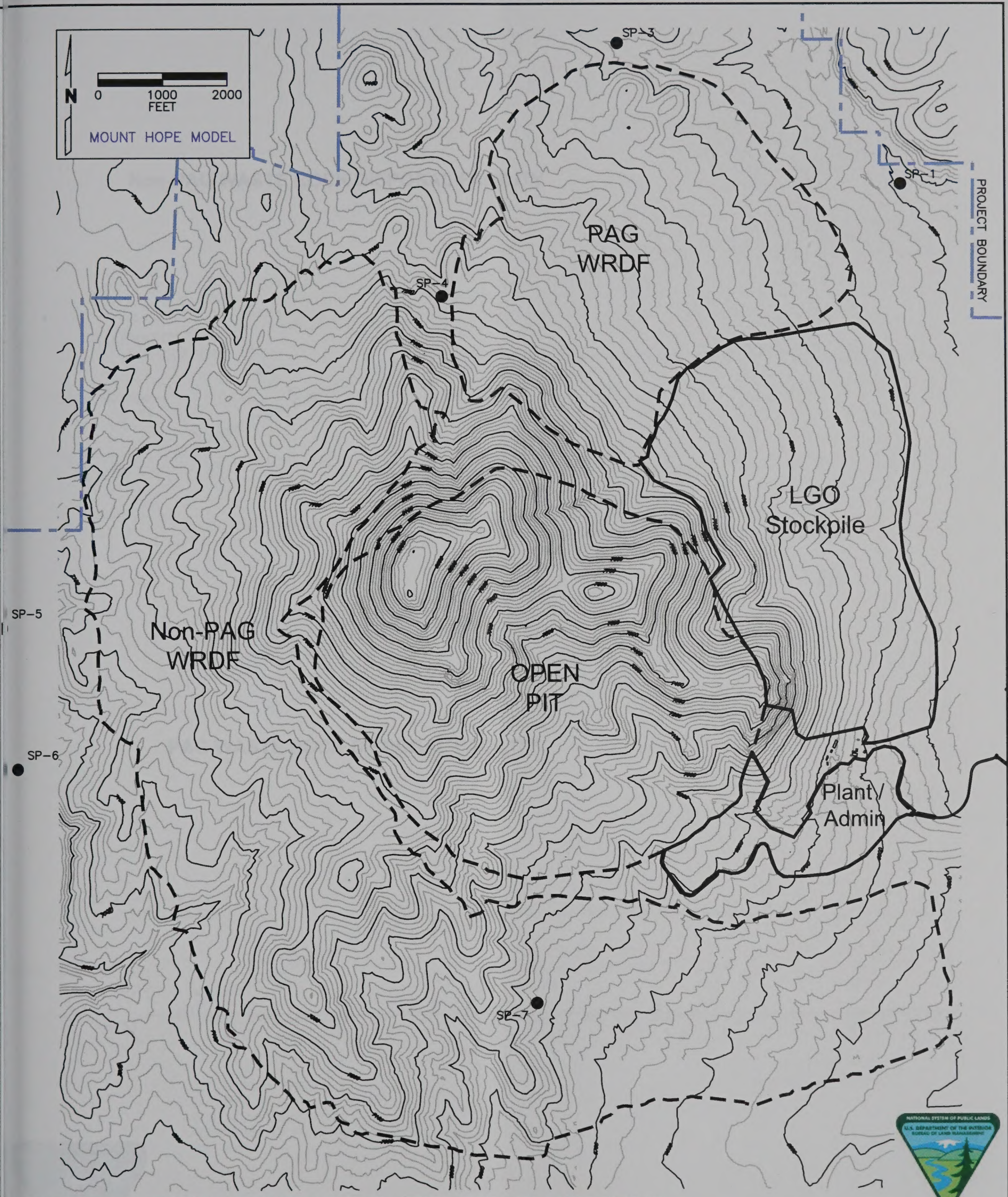
Slope stability analyses were conducted for the WRDFs (EML 2006, page 3-22). Based on the results of the analyses, the WRDFs would be stable for the configurations analyzed (Smith Williams Consultants, Inc. [SWC] 2008a) (Figure 2.1.10).

2.1.3.1 Waste Rock Disposal Facility Design

2.1.3.1.1 Potentially Acid Generating Waste Rock Disposal Facility Design

The PAG WRDF would be designed with a low permeability base layer so that any meteoric water percolating through the PAG material would not infiltrate the subsurface. The objective would be management of water that contacts the PAG waste rock.

To construct the low permeability base layer, the surface would be cleared and grubbed to remove trees, shrubs, vegetation, and salvageable growth media, and graded to achieve positive drainage. **Slash from large trees, shrubs, and roots that are encountered during growth media salvage operations would be mechanically separated from growth media as feasible. This slash material would be stockpiled separately from the growth media where it may be burned, used by the public as fire wood, used in final reclamation as habitat enhancements, or hauled off-site to an approved landfill.** The foundation area would be scarified, moisture conditioned, and compacted to a permeability of less than or equal to 1 x 10^{-5} centimeters per


N
0
1000
2000
FEET
MOUNT HOPE MODEL
SP-3
SP-1
PROJECT BOUNDARY
PAG
WRDF
SP-4
LGO
Stockpile
SP-5
Non-PAG
WRDF
OPEN
PIT
SP-6
Plant/
Admin
SP-7

RAWING MODIFIED FROM INDEPENDENT, MINING CONSULTANTS, INC. TUCSON, ARIZONA, REF. # 18002, 05-03-07

EXPLANATION

● SP-#	Spring
WRDF	Waste Rock Disposal Facility

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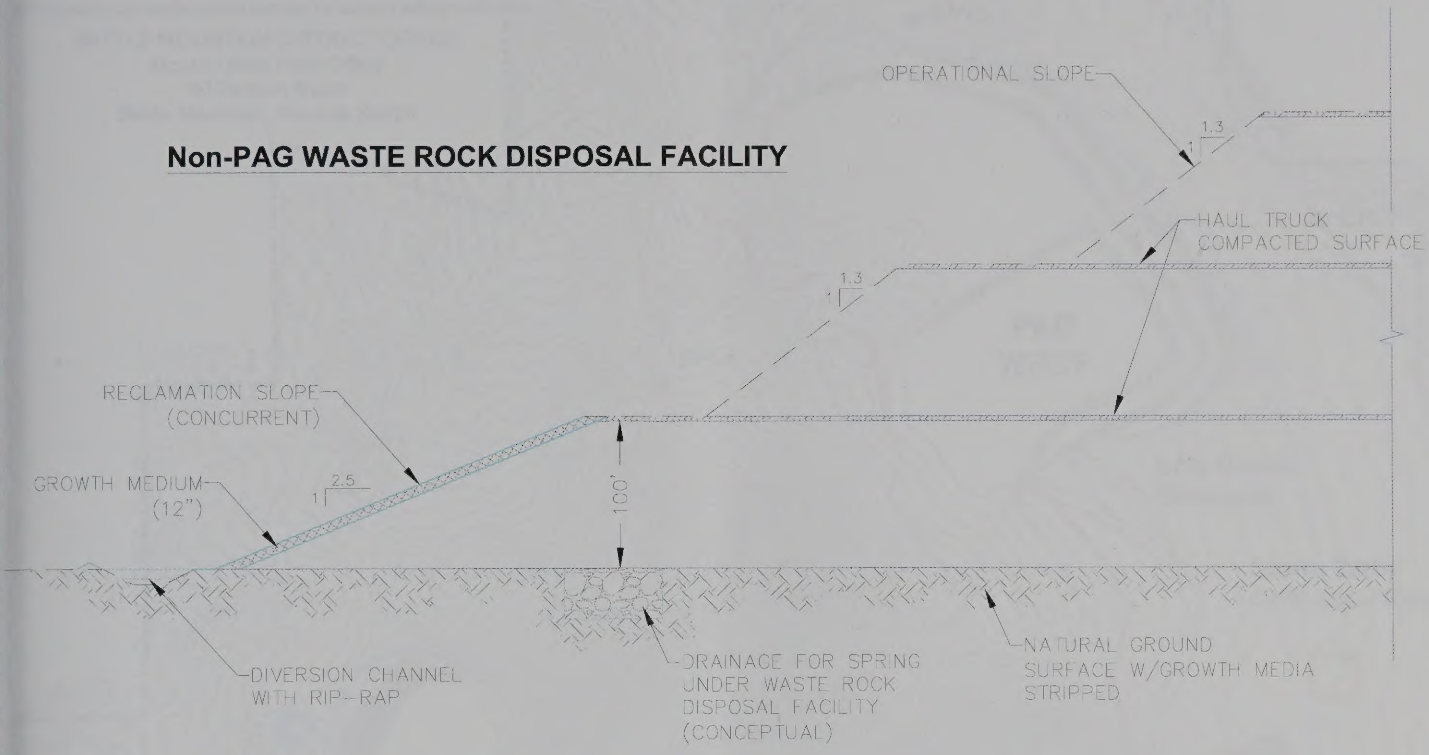
Project Number: 1635
Drawing Name: p1635_Fig2-1-9_LocationofWRDF.dwg

BUREAU OF LAND MANAGEMENT
MOUNT HOPE PROJECT

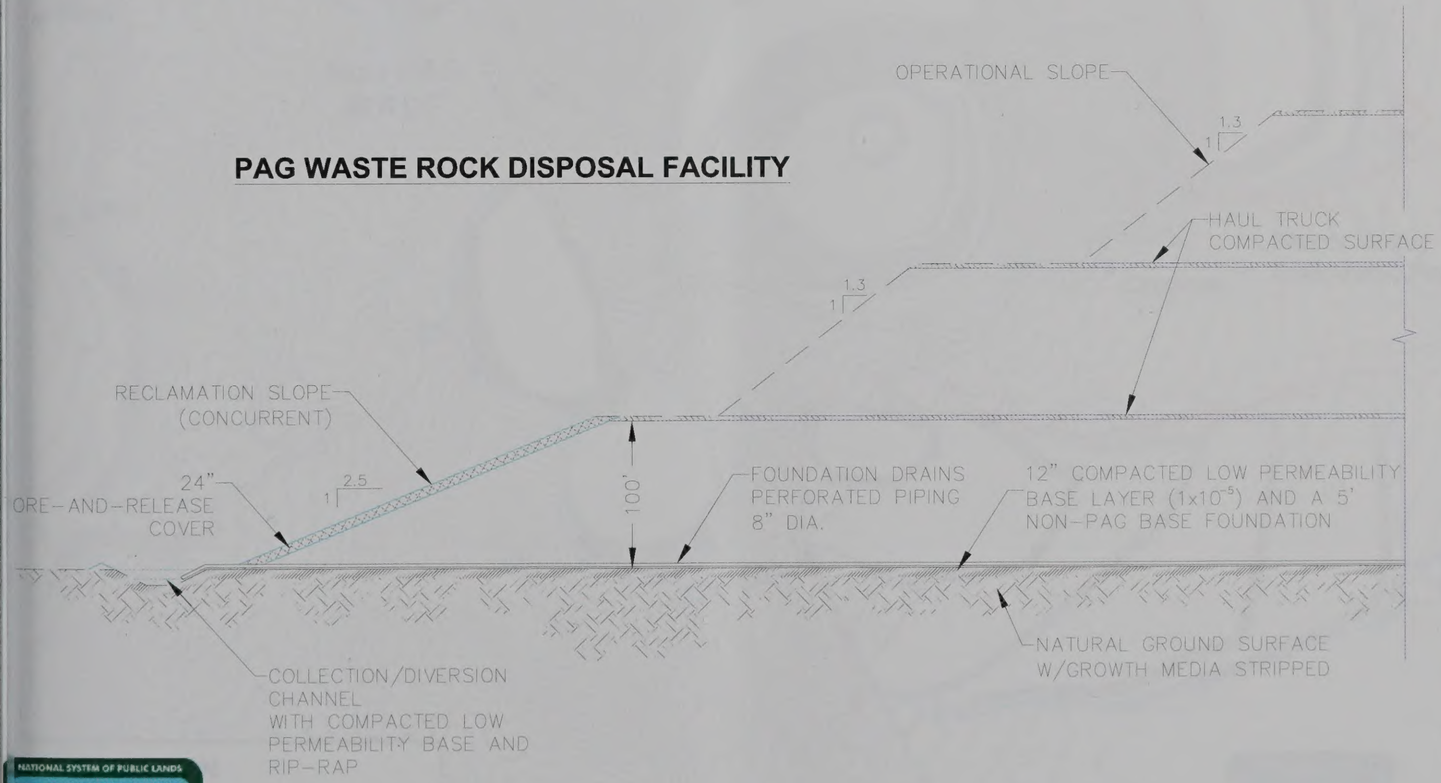
Location of Waste Rock Disposal Facilities

Figure 2.1.9

Non-PAG WASTE ROCK DISPOSAL FACILITY


OPERATIONAL SLOPE
1.3
1
HAUL TRUCK
COMPACTED SURFACE
1.3
1
RECLAMATION SLOPE
(CONCURRENT)
GROWTH MEDIUM
(12")
2.5
1
100'
DIVERSION CHANNEL
WITH RIP-RAP
DRAINAGE FOR SPRING
UNDER WASTE ROCK
DISPOSAL FACILITY
(CONCEPTUAL)
NATURAL GROUND
SURFACE W/GROWTH MEDIA
STRIPPED

PAG WASTE ROCK DISPOSAL FACILITY


OPERATIONAL SLOPE
1.3
1
HAUL TRUCK
COMPACTED SURFACE
1.3
1
RECLAMATION SLOPE
(CONCURRENT)
24"
ORE-AND-RELEASE
COVER
2.5
1
100'
FOUNDATION DRAINS
PERFORATED PIPING
8" DIA.
12" COMPACTED LOW PERMEABILITY
BASE LAYER (1x10^{-5}) AND A 5'
NON-PAG BASE FOUNDATION
COLLECTION/DIVERSION
CHANNEL
WITH COMPACTED LOW
PERMEABILITY BASE AND
RIP-RAP
NATURAL GROUND SURFACE
W/GROWTH MEDIA STRIPPED

NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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06/15/2011	CVD/GSL	RFD

Scale: **Not to Scale**
Project Number: **1635**
Drawing Name: p1635_Fig2-1-10&20_WRDFCrossSections.dwg

BUREAU OF LAND MANAGEMENT
MOUNT HOPE PROJECT

Operational Waste Rock Disposal Facility Cross Section

Figure 2.1.10

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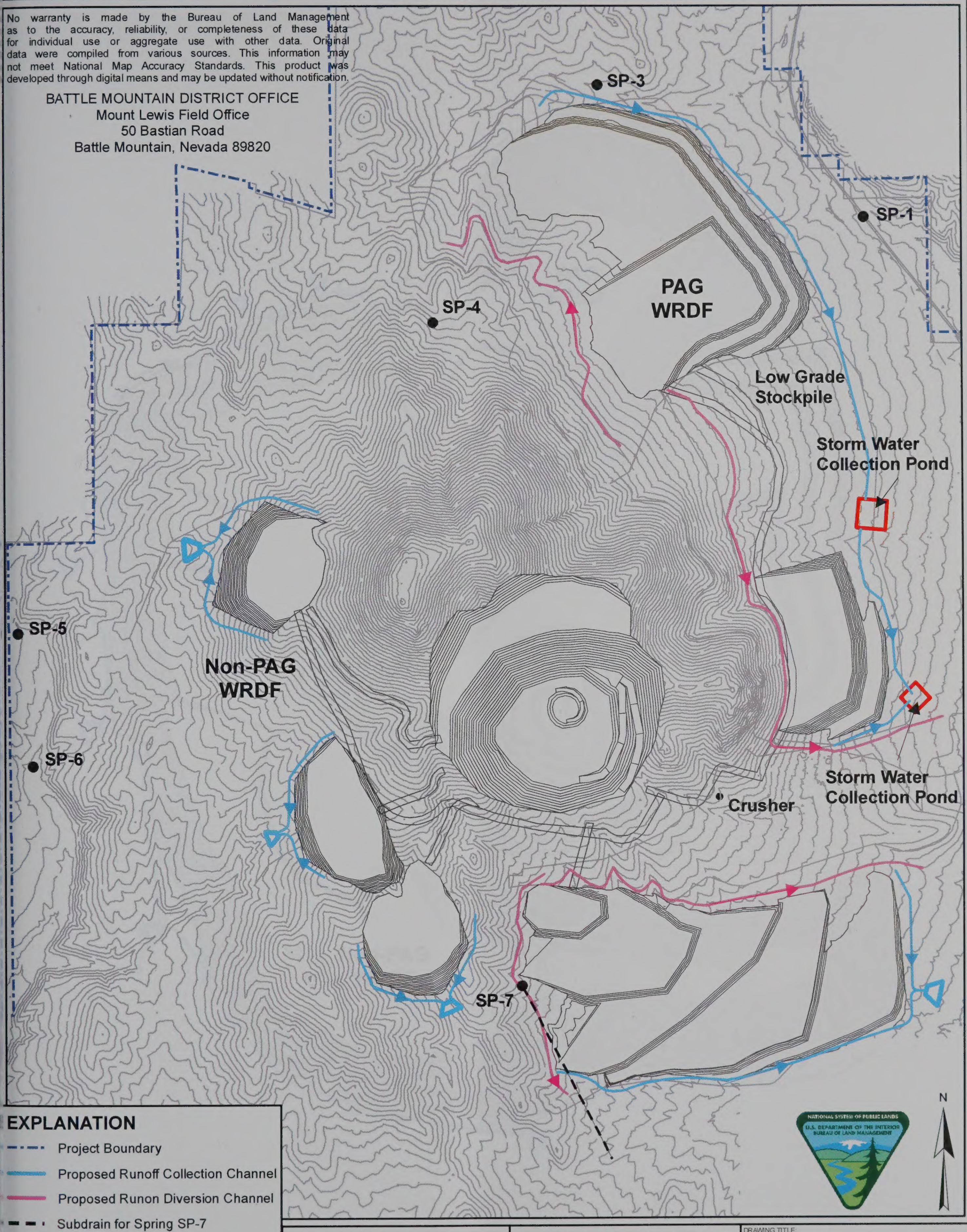
SP-3
SP-1
PAG WRDF
SP-4
Low Grade Stockpile
Storm Water Collection Pond
SP-5
Non-PAG WRDF
SP-6
Storm Water Collection Pond
Crusher
SP-7
N

EXPLANATION

- Project Boundary
- Proposed Runoff Collection Channel
- Proposed Runon Diversion Channel
- Subdrain for Spring SP-7
- ● SP-7 Spring
- Sediment Control Structure
- WRDF Waste Rock Disposal Facility

0 1,000 2,000 Feet

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FILE NAME: p1635_Fig2-1-11_WRDF_EarlyLife.mxd

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MOUNT HOPE PROJECT

DRAWING TITLE:

Conceptual Waste Rock Disposal Facility Early Mine Life

Figure 2.1.11

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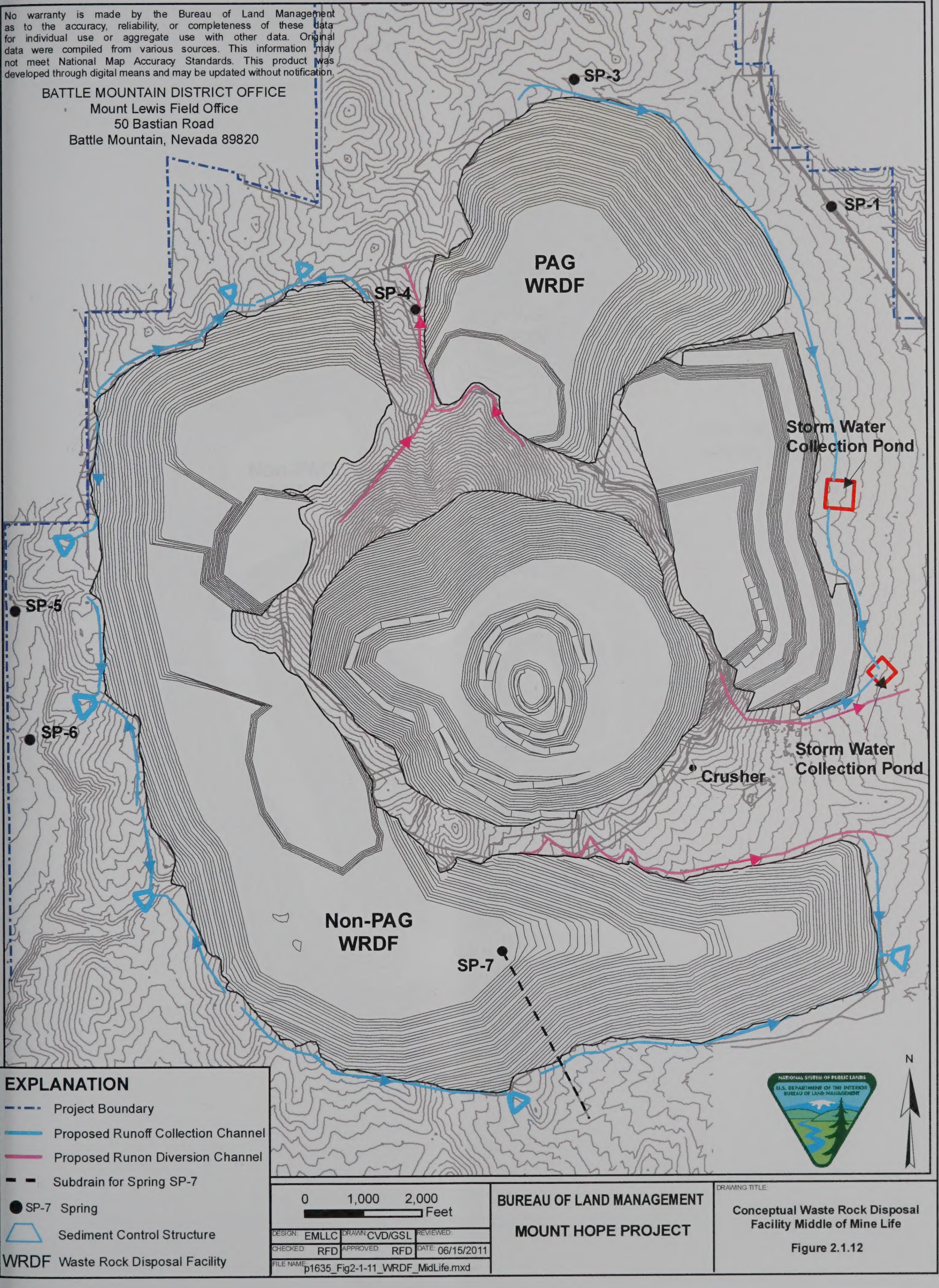

SP-3
SP-1
PAG
WRDF
SP-4
Storm Water
Collection Pond
SP-5
SP-6
Storm Water
Collection Pond
Crusher
Non-PAG
WRDF
SP-7
N
EXPLANATION
Project Boundary
Proposed Runoff Collection Channel
Proposed Runon Diversion Channel
Subdrain for Spring SP-7
SP-7 Spring
Sediment Control Structure
WRDF Waste Rock Disposal Facility
0 1,000 2,000
Feet

DESIGN: EMLLC DRAWN: CVD/GSL REVIEWED:
CHECKED: RFD APPROVED: RFD DATE: 06/15/2011
FILE NAME: p1635_Fig2-1-11_WRDF_MidLife.mxd

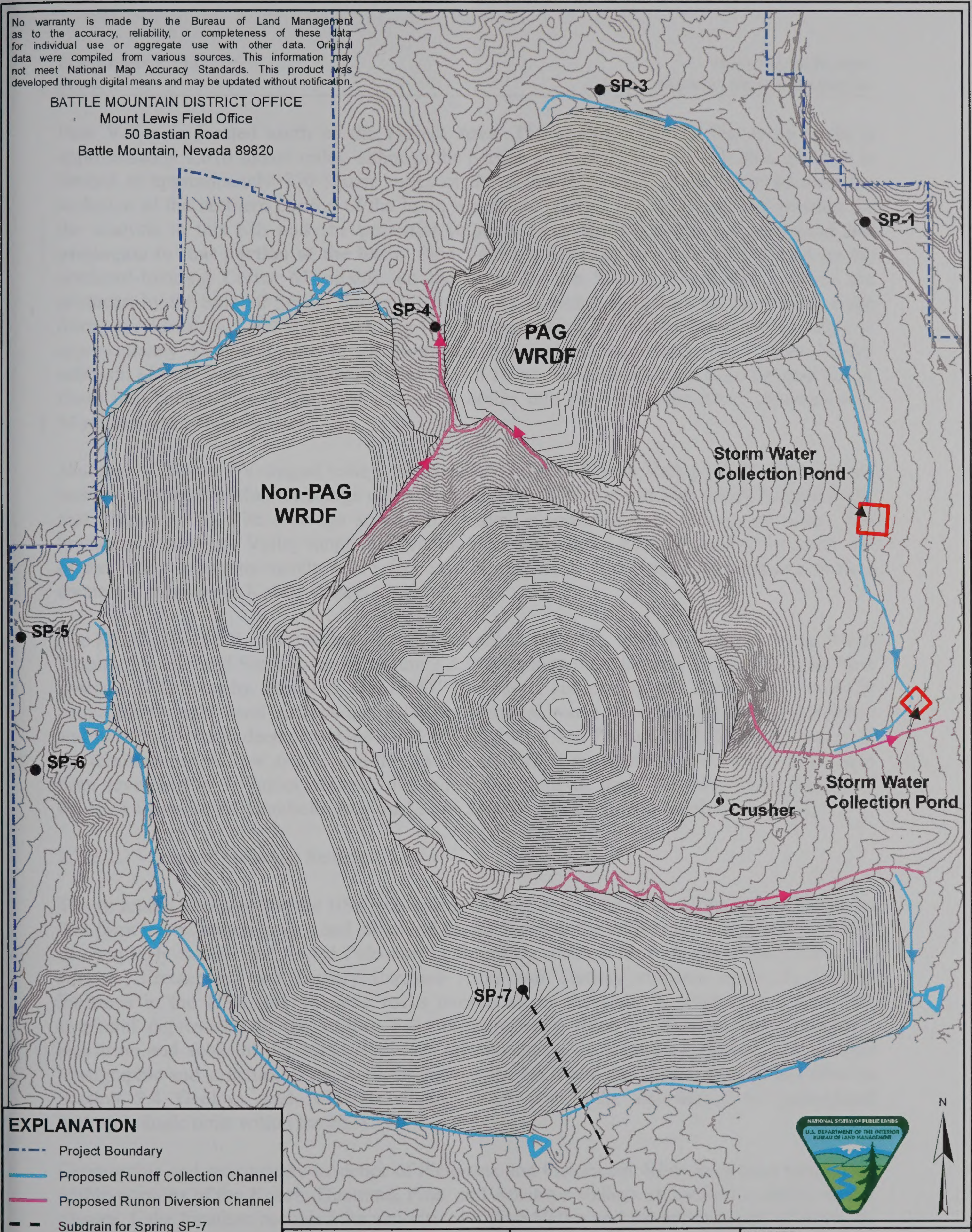
BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Conceptual Waste Rock Disposal Facility Middle of Mine Life

Figure 2.1.12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SP-3
SP-1
SP-4
PAG WRDF
Non-PAG WRDF
Storm Water Collection Pond
Storm Water Collection Pond
SP-5
SP-6
Crusher
SP-7
N
EXPLANATION
Project Boundary
Proposed Runoff Collection Channel
Proposed Runon Diversion Channel
Subdrain for Spring SP-7
SP-7 Spring
Sediment Control Structure
WRDF Waste Rock Disposal Facility
0
1,000
2,000
Feet

DESIGN: EMLLC	DRAWN: CVD/GSL	REVIEWED:
CHECKED: RFD	APPROVED: RFD	DATE: 06/15/2011

FILE NAME: p1635_Fig2-1-13_WRDF_EndofLife.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Conceptual Waste Rock Disposal Facility End of Mine Life

Figure 2.1.13

Pine Valley is located north of the Project Area. The drainage area of the entire basin is approximately 1,010 square miles, although the portion of Pine Valley that is within the HSA is limited to approximately 730 square miles of the southern portion of the basin because the inclusion of the northern portion of the basin would not provide any additional information for the analysis in this EIS **and the potential impacts from the Proposed Action would not propagate to that portion of the basin**. Pine Valley is bounded on the north and west by the northeast-trending Cortez Mountains, on the south by the Roberts Mountains, and on the southeast by the Sulphur Spring Range (Figure 3.2.4). Lowland elevations in Pine Valley range from approximately 5,800 feet amsl along Henderson Creek in the southern part of the valley to approximately 4,840 feet amsl at the Humboldt River at the north end. The Garden Valley subbasin of Pine Valley is directly north of Mount Hope. Surficial drainage from Garden Valley flows into central Pine Valley and ultimately drains into the Humboldt River approximately 56 miles north of Mount Hope.

Antelope Valley is a V-shaped valley, in plan view, open to Kobeh Valley on the northern end and bounded by the Monitor Range on the west and the Antelope and Fish Creek Ranges to the east (Figure 3.2.5). The drainage area of the valley is approximately 450 square miles. The lowlands of Antelope Valley range in elevation from more than 6,800 feet amsl at the south end of the valley to approximately 6,075 feet amsl in the north. Antelope Valley appears to be a connected tributary to Kobeh Valley.

The Kobeh, Diamond, and Antelope Valley portions of the HSA, together with North and South Monitor Valleys and Stevens Basin (Figure 3.2.1) constitute the Diamond Valley Regional Flow System, as defined by Harrill et al. (1988). The basins comprising this system are internally connected by ephemeral streams and subsurface ground water flow through basin-fill aquifers and possibly through deep carbonate aquifers (Tumbusch and Plume 2006). Diamond Valley is the terminus of the flow system and the water resources of the southern part of this basin have been developed for irrigation, mining, municipal, and domestic uses. The Pine Valley portion of the HSA is part of the Humboldt Regional Flow System, as defined by Harrill et al. (1988).

3.2.2.2.2 General Geologic Setting

The structural basins within the HSA are typical of those that occur in the Great Basin. The rocks that form the mountain ranges and structural basins forming the valleys are composed primarily of complexly faulted and folded Paleozoic sedimentary rocks, with widespread occurrences of Jurassic, Cretaceous, and Tertiary intrusive rocks and Tertiary volcanic rocks. At various locations in the HSA, the volcanic rocks overlie all of the older hydrogeologic units. The structural depressions in the valleys have been partially filled by Tertiary and Quaternary lacustrine and subareal deposits, which are unconsolidated to semi-consolidated. The general stratigraphic and structural framework throughout the HSA and the Project Area is described in Section 3.4 Geology and Minerals. Figure 3.2.6 shows the distribution of generalized hydrolithologic units within the HSA.

Geomorphic and sedimentary evidence of Pleiocene and Pleistocene lakes have been recognized within portions of the Kobeh, Diamond, Pine, and Antelope Valleys and reflect a cooler, wetter climate. Lake Jonathan occupied the majority of Kobeh Valley and the northern part of Antelope Valley (Figure 3.2.7), while Lakes Pine and Diamond occupied their respective basins, with Lake Diamond extending slightly westward into eastern Kobeh Valley (Reheis 1999). The

expanded in 2007 and 2008 beyond the original "five-mile radius" geographic area surveyed between 2005 and 2007. This includes spring and stream sites throughout the Roberts Mountains, spring and stream sites in Pine Valley, and flowing wells and springs on the floor of Kobeh Valley (JBR 2011). The period of baseline monitoring covers a range of seasonal and climatic conditions, including above and below average precipitation years. Specifically, calendar years 2006 and 2008 were below average precipitation, years 2005, 2007, and 2010 were above average, and years 2009 and 2011 were near average, based on precipitation records at Eureka (Eureka COOP weather station). The fluctuations in stream and spring flows observed due to seasonal and longer term climatic variability are described in JBR (2011) and Montgomery et al (2010).

3.2.2.2 Existing Conditions

The following paragraphs describe the existing hydrologic conditions within the study area and the baseline conditions for the EIS water resources analysis. The baseline description consists of a detailed description, including current status and trends, of existing surface water and ground water quantity, and use within the study area. The description also includes a discussion of the hydrogeology and ground water flow patterns as they currently exist.

3.2.2.2.1 Physiographic and Hydrologic Setting

The Project Area is located in the central Great Basin of the Basin and Range physiographic province. The HSA for the EIS water resources analysis encompasses the Project Area and includes four hydrographic basins: Kobeh; Diamond; Pine; and Antelope Valleys (Figure 3.2.1).

Kobeh Valley is the largest of the basins entirely within the HSA, with a drainage area of approximately 860 square miles. The valley is approximately 35 miles across in both an east to west direction and a north to south direction (Figure 3.2.2). The Kobeh Valley alluvial basin is bounded on the north by the Roberts Mountains, on the west by the Simpson Park Mountains, on the east by Whistler Mountain, and on the south by the northern boundaries of the Monitor Range and Monitor and Antelope Valleys. The lowlands of Kobeh Valley range from approximately 6,400 feet amsl on the west side of the valley to approximately 6,000 feet amsl on the east side at Devils Gate, which is an erosional gap where eastward surficial drainage in the valley enters Diamond Valley.

Diamond Valley is the most hydrologically stressed of the four basins in the HSA because much of the ground water in this basin is extensively used for irrigation, domestic, and municipal purposes. The valley has a drainage area of approximately 750 square miles and is bounded on the west by the Sulphur Spring Range and Whistler Mountain, on the north by the Diamond Hills, on the east by the Diamond Mountains, and on the south by the Fish Creek Range (Figure 3.2.3). The lowlands of Diamond Valley range from approximately 6,200 feet amsl at the south end to approximately 5,770 feet amsl at the playa in the north end of the valley. Surficial drainage in Diamond Valley is from the margins of the valley to its long axis and then northward to the playa. There is no surface water outflow from the basin and an extensive playa occupies the northern half of the valley because it is a topographically closed basin. Irrigated agriculture dominates the southern half of Diamond Valley.

3.2 Water Resources - Water Quantity

3.2.1 Regulatory Framework

Approval of the Proposed Action would require authorizing actions from other federal or state agencies with jurisdiction over the use of water resources for the Project. The regulation, appropriation, and preservation of water in Nevada falls under both state and federal jurisdiction. When a proposed project has the potential to directly or indirectly affect the waters under State of Nevada jurisdiction, then the State of Nevada is authorized to implement its own permit programs under the provisions of state law or the Federal Clean Water Act (CWA).

The Nevada State Engineer Office of NDWR is responsible for the administration and adjudication of water rights. Water appropriation permits are obtained through the Nevada State Engineer.

3.2.2 Affected Environment

3.2.2.1 Study Methods

Water resources information, descriptions and data are based on baseline studies of surface water conditions near Mount Hope conducted by SRK, and Interflow Hydrology (Interflow). Between 2005 and 2007, SRK collected data from three surface water locations along Henderson Creek, 24 springs and seeps, and one mine adit drainage (the Zinc Adit), providing chemistry and flow data for springs and streams generally within a five-mile radius of Mount Hope (SRK 2008a). SRK also performed a more extensive regional spring and seep survey in the fall of 2007, visited 229 sites, and collected water samples from 69 of those sites (SRK 2008c). Interflow made additional stream flow and spring and seep measurements during field investigations in 2007 and 2008 (Montgomery et al. 2010), including Roberts Creek, Rutabaga Creek, Snow Water Canyon, Ackerman Canyon, and Ferguson Creek in Kobeh Valley; Henderson and Vinini Creeks in Garden Valley (subbasin of Pine Valley); Tonkin Spring, Pete Hanson Creek, and Willow Creek in Pine Valley; and Allison Creek in Antelope Valley.

Baseline information describing the hydrogeologic conditions in the study area is presented in ten reports developed by various EML consultants (SRK 2008a; Interflow 2010; Interflow 2011; Montgomery & Associates 2010; Montgomery et al. 2010; Montgomery & Associates 2011; InTerraLogic, Inc. 2011; EML 2011; JBR 2009; 2010**; 2011**). The current understanding of the hydrogeologic conditions is based on the following: 1) previous studies of water resources in Pine, Diamond, Kobeh, Antelope, and Monitor Valleys (Eakin 1961 and 1962; Rush and Everett 1964); 2) lithologic logs for exploration drilling, monitoring wells, and test production wells; 3) aquifer pumping test results; 4) hydraulic properties of hydrolithologic units within the Hydrographic Study Area (HSA) compiled from site-specific and regional-scale hydrologic investigations; 5) water-level data for the HSA assembled from published and unpublished sources; and 6) the results of surface water field surveys. The results of previous studies have been combined with site-specific data to develop a conceptual understanding of the hydrogeologic ground water conditions in the study area.

Baseline data collection, including surface water monitoring, was initiated in 2005 and continues through the present. The geographic area of monitoring was significantly

Other Resources or Uses	Not Present	Present/ Not Affected	Present/ May be Affected	Rational/Reference Section
Wild Horses			X	See Section 3.13.
Land Use			X	See Section 3.14.
Recreation			X	See Section 3.15.
Auditory Resources			X	See Section 3.16.
Socioeconomic Values			X	See Section 3.17.
Historic Trails			X	See Section 3.20.
Transportation and Access			X	See Section 3.24.
Water Quantity			X	See Section 3.3.
Wilderness Study Areas		X		See Section 3.15.
Wildlife			X	See Section 3.23.

The BLM has used environmental data collected in the Project Area to predict environmental effects that could result from the Proposed Action and alternatives. A level of uncertainty is associated with any set of data in terms of predicting outcomes, especially where natural systems are involved. The predictions described in this analysis are intended to allow comparison of alternatives to the Proposed Action, as well as provide a method to compare the anticipated impacts with the identified significance criteria. **As stated in 40 CFR 1502.1:**

> **The primary purpose of an environmental impact statement is to serve as an action-forcing device to insure that the policies and goals defined in the Act are infused into the ongoing programs and actions of the Federal Government. It shall provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment. Agencies shall focus on significant environmental issues and alternatives and shall reduce paperwork and the accumulation of extraneous background data.**

3.1.1 Direct and Indirect Impact Significance and Mitigation

40 CFR 1502.16 states that an EIS "shall include discussions of: (a) Direct effects and their significance (Section 1508.8). (b) Indirect effects and their significance (Section 1508.8)." The analysis in Chapter 3 includes significance determinations for each impact, which does not preclude the identification of mitigation. Based on a combination of the conclusions from the analysis for each potential impact, the implementation of applicant committed practices as outlined in Section 2.1.14, and the potential feasibility of implementing mitigation measures, mitigation measures are not proposed for all potential impacts. Mitigation is identified in Chapter 3 for various resources where it is feasible to do so, irrespective of whether or not the impacts are determined to be significant.

Supplemental Authority Element	Not Present	Present/ Not Affected	Present/ May be Affected	Rational/Reference Section
Farmlands (prime and unique)	X			Element is not present.
Forests and Rangelands (Healthy Forest Restoration Act [HFRA] only)	X			This Project does not meet the criterion for expedited NEPA compliance under the HFRA.
Human Health and Safety			X	See Sections 3.17, 3.19, and 3.24.
Migratory Birds			X	See Section 3.23.
Native American Traditional Values			X	See Section 3.22.
Noxious Weeds, Invasive & Nonnative Species			X	See Section 3.10.
Threatened or Endangered Species			X	See Section 3.23.
Wastes, Hazardous or Solid			X	See Sections 3.19.
Water Quality - Surface and Ground			X	See Section 3.3.
Wetlands and Riparian Zones			X	See Section 3.11.
Wild and Scenic Rivers	X			Element is not present.
Wilderness[1]	X			Element is not present.

[1] Lands with Wilderness Characteristics: The Project Area is located within the Nevada Initial Inventory Units NV-060-505, 502, 512, 503, 511, 513, 520, 521, 522, 530, 531, and 533. According to the 1980 Initial Inventory, each of these units was considered to be lacking wilderness character due to an absence of either natural character or because of a lack of outstanding opportunities for solitude or primitive recreation. Current analysis, completed April of 2011, of Master Title Plats (MTPs), aerial photographs and route inventory data collected in 2006, and discussions with resource specialists indicate the Project Area is in an overall unnatural condition. This finding of unnatural condition is due to surface disturbance from historic and current mining operations as well as the abundance of developed roads and routes throughout the area. As outlined in Manual 6303, the analysis concluded the area clearly lacks wilderness character and is not recommended for further evaluation at this time.

In addition to the elements listed under supplemental authorities, the BLM considers other resources and uses that occur on public lands and the impacts that may result from the implementation of the Proposed Action. Other resources or uses of the human environment that have been considered for this EIS are listed in Table 3.1-2. Resources or uses that may be affected by the Proposed Action or other alternatives are further considered in the EIS.

Table 3.1-2: Resources or Uses Other than Elements Associated with Supplemental Authorities

Other Resources or Uses	Not Present	Present/ Not Affected	Present/ May be Affected	Rational/Reference Section
Geology and Minerals			X	See Section 3.4.
Paleontology	X			See Section 3.5.
Visual Resources			X	See Section 3.7.
Soil Resources			X	See Section 3.8.
Vegetation Resources			X	See Section 3.9.
Forest Products			X	See Section 3.25.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

The Project Area is located within the Basin and Range Physiographic Province, which is characterized by broad valleys separated by mountain ranges. Elevations range from approximately 6,400 feet amsl in Kobeh Valley to over 8,400 feet amsl at the top of Mount Hope. Vegetation in the Project Area ranges from piñon/juniper to upland communities containing grasses and big sagebrush.

The Project is located in the central Great Basin section of the Basin and Range Physiographic Province. Block faulting in the area has resulted in generally north south trending topography. Structural deformation has resulted in a series of valleys separated by mountain ranges. The three valleys of hydrologic interest are located primarily within Eureka County and include Diamond, Kobeh, and Pine Valleys. A majority of the Mount Hope watershed drains to the east and south into Diamond Valley. Except for a small area on the northwestern flank of the mountain, the remainder drains to the west and south into Kobeh Valley. A minor tributary to Henderson Creek, located within Pine Valley, drains the small area on the northwestern flank of Mount Hope.

The purpose of this EIS is to describe the existing environment in the Project Area and surrounding areas that might be affected by the Proposed Action and alternatives under consideration. Supplemental authorities that are subject to requirements specified by statute or executive order (EO) must be considered in all BLM environmental documents. The 18 elements associated with the supplemental authorities listed in the NEPA Handbook (BLM 2008a, Appendix 1) are listed in Table 3.1-1. The table lists the elements and their status in the Project Area as well as the rationale to determine whether an element present in the Project Area would be affected by the Proposed Action. Supplemental authorities that may be affected by the Proposed Action are analyzed in Chapter 3 following the discussion of the Affected Environment for each element, resource, or use. Those elements listed under the supplemental authorities that do not occur in the Project Area and would not be affected are not discussed further in this EIS. The elimination of nonrelevant issues follows CEQ policy, as stated at 40 CFR 1500.4.

Table 3.1-1: Elements Associated with Supplemental Authorities and Rationale for Detailed Analysis for the Proposed Action

Supplemental Authority Element	Not Present	Present/ Not Affected	Present/ May be Affected	Rational/Reference Section
Air Quality			X	See Section 3.6.
Areas of Critical Environmental Concern	X			Element is not present.
Cultural Resources			X	See Section 3.21.
Environmental Justice		X		See Section 3.18.
Fish Habitat			X	See Section 3.23.
Floodplains	X			Element is not present.

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2.2.5.9 Different PAG Waste Rock Management Alternative

Under this alternative, the Proposed Action would be developed as outlined in Section 2.1, except a different management technique would be used with the PAG waste rock. A single WRDF would be constructed, and the PAG material would either be managed in isolation cells within the WRDF, or the PAG material would be mixed with the Non-PAG material throughout the life of the mining operation.

It is highly uncertain whether either of these management techniques would be successful in the management of the PAG material and thus minimize or eliminate the potential of the development of uncontrolled ARD or impacts to waters of the state. The timing of the mining of the PAG versus Non-PAG material would not allow for the mixing of the two material types to minimize the potential for the migration of the leached constituents. Placement of the PAG waste rock on a prepared base with solution collection and management provides for a higher level of protection with respect to potential impacts to waters of the state. This alternative does not meet the criteria under Section 2.2 and has been eliminated from detailed consideration because of the high degree of uncertainty and the increased risk of potential impacts to waters of the state.

2.3 BLM Preferred Alternative

Chapter 9, Section 9.2.7.3 of the BLM NEPA Handbook directs that an EIS "...identify the agency's preferred alternative. ... For external proposals or applications, the proposed action may not turn out to be the BLM's preferred alternative because the BLM would often present an alternative that would incorporate specific terms and conditions on the applicant."

Thus, the BLM has selected a Preferred Alternative based on the analysis in this EIS. This Preferred Alternative is the alternative that best fulfills the agency's statutory mission and responsibilities, giving consideration to socioeconomic, environmental, technical, and other factors. The BLM has determined that the Preferred Alternative is the Proposed Action as outlined in Chapter 2 of the **Final** EIS, with the inclusion of the identified mitigation measures to the Proposed Action as specified in Chapter 3 of the **Final** EIS.

well as decreased employment opportunities and reduced socioeconomic impacts. This alternative does not meet the Purpose and Need of the Proposed Action as defined in Section 1.4, because the known mineral deposit would not be fully mined **and it would not be economically feasible**. For these reasons, the Reduced Project Alternative does not meet the criteria under Section 2.2 and has been eliminated from detailed consideration.

2.2.5.7 Different Facility Locations within the Project Area Alternative

This alternative considers different locations within the Project Area for the major mine facilities (i.e., open pit, TSFs, WRDFs, and processing plant), which would create the principal impacts under the Proposed Action. As discussed above, an evaluation of different facility locations was conducted by EML in their feasibility evaluation of the Project; this evaluation is included in this EIS as Appendix **B**.

Analysis of different locations under this alternative is similar to that for the Different Facility Locations Outside the Project Area Alternative (Section 2.2.5.3). This alternative does not meet the criteria under Section 2.2 and has been eliminated from detailed consideration because of the substantial logistical and transportation disadvantages, and because it would result in increased surface disturbance.

2.2.5.8 Different Powerline Alternative

Under this alternative, the Proposed Action would be developed as outlined in Section 2.1. However, the connection to the regional power grid would be in a different location as would the powerline route to the Project facilities.

A new substation for the Project would be located immediately south of the South TSF where the NV Energy 345-kV Falcon-Gondor powerline intersects the Project Area. The new substation would tie directly into the existing NV Energy 345-kV Falcon-Gondor powerline. The substation would be designed to provide the power necessary for Project operation. From the new substation, the Project powerline would follow the same route through the Project Area as the powerline under the Proposed Action. This alternative would eliminate the need to construct a new powerline, adjacent to the Falcon-Gondor powerline from the existing Machacek Substation to the Project Area, through the western portion of Kobeh Valley.

Power for the Project was investigated by NV Energy in early 2007. NV Energy determined that two feasible power supply options existed for the Project. The 230-kV option with a tap at the Machacek Substation was selected over the 345-kV option. Design, cost, and reliability issues were considered. In addition, the 345-kV line serves as the "backbone" for electrical distribution in the area, which would make a tie-in problematic with respect to schedule and the duration of service interruption. As a result, the use of 345-kV line was determined to be technically infeasible. EML entered into a transmission agreement with NV Energy in late 2008 for 75 MW, substantiating that the 230-kV system at Machacek can provide sufficient power for the Project. The Project is located within the **NV Energy and** Mt. Wheeler Power service territory.

2.2.5.4 Increased Ore Processing to Match the Mining Schedule Alternative

Under this alternative, the ore processing facility would process the ore at the same rate that it would be mined under the Proposed Action, thereby requiring construction of an ore processing facility with greater throughput capacity. As a result, the Project would be in operation for 32 years rather than the 44 years under the Proposed Action. Under this alternative, there would be an approximately one to two percent increase in the number of employees above that expected under the Proposed Action. However, the length of employment for almost all the positions would only be 32 years.

This alternative would increase yearly air emissions during the life of the Project by approximately 50 percent and decrease length of employment opportunities due to the reduced life of the project in comparison to the Proposed Action. Socioeconomic impacts, both positive and negative, would be reduced as compared to the Proposed Action because tax receipts and wages would occur over a shorter time period and not necessarily at a proportionally greater amount than under the Proposed Action. In addition, the demands on the local infrastructure made by employees and other Project-related individuals would be of shorter duration than the Proposed Action. In addition, implementation of this alternative would not reduce any of the other environmental consequences of the Proposed Action and, therefore, does not create any environmental advantage in comparison with the Proposed Action. For these reasons, the Increased Ore Processing to Match the Mining Schedule Alternative does not meet the criteria under Section 2.2 and has been eliminated from detailed consideration.

2.2.5.5 Decreased Mining to Match the Ore Processing Schedule Alternative

Under this alternative, the mining rate would be decreased to match the ore processing rate under the Proposed Action. This alternative would decrease air emissions during the first 32 years of the Project due to the slower mining rates and increase air emissions during the last 12 years of the Project, because mining would occur during these last 12 years of the ore processing, in comparison with the Proposed Action. The alternative would extend and increase the ground water impacts due to the need to dewater the open pit for an additional 12 years, decrease employment opportunities due to the smaller mining operation, and change the socioeconomic impacts, because of the smaller work force, in comparison with the Proposed Action. The complete reclamation of the WRDFs would be postponed. Implementation of this alternative would not result in any compelling environmental advantage relative to the Proposed Action. For these reasons, the Decreased Mining to Match the Ore Processing Schedule Alternative does not meet the criteria under Section 2.2 and has been eliminated from detailed consideration.

2.2.5.6 Reduced Project Alternative

A Reduced Project Alternative would result in the construction of a smaller open pit and smaller associated facilities. As a result of the smaller scale operation under this alternative, there would **be** a reduction in the impacts to soils, vegetation, air quality, and ground water in comparison with the Proposed Action because there would be less surface disturbance, less air emissions, and less dewatering. However, this alternative would increase the potential impacts to known mineral resources by not developing the defined mineral resource that would be mined under the Proposed Action, which would not be consistent with the national mineral policy outlined in the MMPA. In addition, this alternative would have smaller water supply production operations, as

2.2.5.2 Different Waste Rock Disposal Facility Heights Alternative

Under this alternative, the WRDF configurations would be changed so that the WRDF heights would vary. Lower heights on the southern portion of the WRDF would be established in an effort to reduce the impacts to the Pony Express Historic Trail setting. As a result, the footprint of the WRDFs would be increased to accommodate the change in storage volume. This would include the time necessary to construct the WRDFs, assuming the same equipment fleet as under the Proposed Action, and therefore increase the length of time necessary to complete the mining of the open pit. Therefore, activities under this alternative would occur over a longer time period in comparison with the Proposed Action. This alternative would increase the amount of surface disturbance and, therefore, the impacts to vegetation, wildlife, and soils, as well as increasing air emissions, due to the increased time frames for mining and longer haul distances during the life of the Project. This alternative would decrease, but not substantially reduce, the impacts to the Pony Express Historic Trail setting in comparison with the Proposed Action. For these reasons, the Different Waste Rock Disposal Facilities Height Alternative does not meet the criteria under Section 2.2 and has been eliminated from detailed consideration.

2.2.5.3 Different Facility Locations Outside the Project Area Alternative

This alternative considers different locations outside of the Project Area for major mine components (i.e., open pit, waste rock disposal, tailings facility) which would create the principle environmental impacts from the Proposed Action.

As part of the development of the Proposed Action by EML, three basic TSF configurations were evaluated by EML as follows: a) a TSF to the west of SR 278 and east of the open pit; b) a TSF south of the Pony Express Historic Trail; c) a TSF to the east of SR 278. The first configuration had three variations; the second and third configurations each had two variations. As a result, seven TSF configurations were considered by EML during the development of the Proposed Action. A copy of the EML's decision matrix is incorporated in this EIS as Appendix **B**. The configuration that was selected by EML's Proposed Action minimizes the potential impacts to SR 278, Diamond Valley, deer migration routes, and the Pony Express Historic Trail.

The location of the proposed open pit is strictly dictated by the location of the identified ore deposit; therefore, no location alternatives for the open pit would be possible. The proposed location of the Project WRDFs was selected by EML after consideration of several operational, cost, and environmental factors that included the following: a) minimizing truck haul distance; b) minimizing the gradient from the open pit to the WRDFs; c) adequate waste rock storage capacity; d) avoidance of sensitive environmental receptors; e) consolidation of mine facilities; and f) absence of suitable mining reserves below the WRDFs.

Relocating either the WRDFs or the TSF as described in the Proposed Action to locations outside of the Project Area would not avoid any of the environmental effects, nor lessen below the level of significance. This alternative would result in increased surface disturbance and air emissions associated with longer haul distances. The visual impacts under this alternative would not be lessened, but would be redistributed based on the location of the facilities. For these reasons, the Different Facility Locations Outside the Project Area alternative does not meet the criteria under Section 2.2 and has been eliminated from detailed consideration.

addressed under the Partial Backfill Alternative. The Partial Backfill Alternative is discussed under Section 2.2.2, and the associated impacts are outlined in Chapter 3.

Based on the mine plan and pit configuration, backfilling could not begin until the end of the mining sequence. Under this alternative, the same amount of surface disturbance would occur as under the Proposed Action because the backfill material would be hauled to the WRDFs so that the Mount Hope open pit could be mined. Once the ore was removed from the open pit the waste rock and overburden would then be hauled back from the WRDFs to the open pit. The backfill would likely commence in Year 32 and be complete in approximately Year 64, resulting in a project that is 20 years longer than the Proposed Action. The rim of the open pit has varying elevations. At the southeast corner of the open pit the pit rim elevation is approximately 6,900 feet amsl. The northwestern corner of the open pit is part of the high wall cut into Mount Hope, which has an elevation of 8,200 feet amsl. The ore to waste ratio is 1:1.6 and the swell factor for the volume difference for the mined and handled waste rock as compared to unmined rock is conservatively assumed to be 20 percent. Therefore, the waste rock volume would be insufficient to completely fill the open pit. As a result, the northwestern portion of the open pit would remain with a highwall on the southeastern flank of Mount Hope, and the WRDFs would be eliminated. The complete backfilling of the open pit would be accomplished by the same fleet and personnel that completed the mining, and as a result, employment would be approximately 370 through the end of ore processing (Year 44) with reduced staffing from Year 44 through the completion of the complete backfilling (Year 64).

Backfilling the open pit would result in covering additional mineral resources that would not be currently considered ore, such as the lower grade Mo mineralization in the open pit wall and the other metal mineralization that is known to occur in the surrounding host rock adjacent to the open pit walls. While this is not a reason to eliminate this alternative from detailed consideration, this scenario would be inconsistent with the **MMPA** [30 U.S.C. 21a] and the Materials and Mineral Policy, Research, and Development Act of 1980 [30 U.S.C. 1601], because it would reduce the opportunity for future mineral development associated with the mineralizing system in the Mount Hope area.

This alternative would decrease visual impacts from the Proposed Action to the Historic Trail but not below the level of significance. Although visual impacts would be reduced, the area is classified as Visual Resource Management (VRM) Class IV, and implementation of the Proposed Action would be consistent with the restrictions on VRM Class IV areas. The pit would remain visible due to insufficient backfill material. This alternative would increase air quality impacts resulting from increased transport of waste rock material and would decrease the opportunity for future extraction of potential mineral resources. The mining work force for the project would be employed for a longer time period to accomplish the backfilling operations. In addition, this alternative would have similar potential impacts as the Partial Backfill Alternative. **Under this alternative, the ground water quality within the pit backfill would be anticipated to be impacted by waste materials (Non-PAG) deposited in the open pit and from infiltrating the runoff from pit walls. This poor-quality water could flow from the confines of the former pit shell into the surrounding ground water, degrading waters of the state.** For these reasons, the Complete Backfill Alternative does not meet the criteria under Section 2.2 and has been eliminated from detailed consideration.

treating the low-grade ore (grading 0.042 percent Mo), which would be set aside for milling following the end of the open pit mining phase.

An alternative with half the annual production of the Proposed Action has not been designed **since this alternative was not determined to be economically feasible by EML**; however, for the sake of comparison, there are several facets of a half-production rate project that could be anticipated. Mining and processing equipment would be smaller, as would ancillary facilities (powerline supply and well field **infrastructure** for example). However, ultimate disturbance from the tailings impoundments, open pit and waste rock disposal facilities would eventually grow to the same size as in the Proposed Action, albeit at half the rate. Water consumption rates would be approximately half, although economies of scale (lower per unit operational cost when there are greater throughputs) would be lost, and water consumption on a per-unit basis would be higher than in the Proposed Action (i.e., more evaporation on a per unit basis than under the Proposed Action) **because the open water in the tailings pond would exist for twice as long during the processing of the same amount of ore. Therefore, this alternative would likely result in twice as much evaporation**. The smaller plant size would likely result in a slight decrease in the number of construction employees. Operations employee members would be less than that required for the Proposed Action (regardless of the size of mine or mill equipment, it generally takes the same number of employees to operate and maintain it). It is estimated that the decrease in operations employment for the half-production alternative would be about 30 percent. The employment timeframe would be twice as long as under the Proposed Action. Reagent consumption would be the same on a per-unit (of production) basis, but the smaller consumption rate would decrease storage requirements and material shipments. Profitability would be reduced, as would tax revenues. Tax revenues would be reduced by approximately 40 percent, relative to the Proposed Action, in the first 44 years of this alternative.

While the Slower, Longer Project Alternative may not meet the purpose and need as stated in Section 1.4, the BLM elected to analyze this alternative in detail at the request of a cooperating agency (Eureka County). The BLM's decision is consistent with its responsibility as the lead agency according to "A Desk Guide to Cooperating Agency Relationships and Coordination with Intergovernmental Partners" (BLM 2012a) and 40 CFR 1501.6.

2.2.5 Alternatives Considered and Eliminated from Detailed Consideration

Several alternatives were identified for consideration in this **Final** EIS. The following is a discussion of those alternatives identified through the scoping process, including alternatives identified by the public, that have been eliminated from detailed consideration in this **Final** EIS. The alternatives were considered relative to the criteria outlined in Section 2.2.

2.2.5.1 Complete Backfilling Alternative

This alternative would involve the complete backfilling of the proposed Mount Hope open pit with Mount Hope overburden and waste rock material in the two WRDFs. A Complete Backfill Alternative would primarily address potential visual impacts **and evaporation impacts** associated with the Proposed Action. Even though this alternative would address the creation of a pit lake, the intent of this alternative is not to address this issue since the pit lake issue is backfilling activities. Tax revenues would be similar to the Proposed Action over the 44-year life of this alternative. Under this alternative, the floor of the open pit would be reclaimed with an application of growth media and then seeded.

2.2.3 Off-Site Transfer of Ore Concentrate for Processing Alternative

Under this alternative, the open pit, WRDFs, and TSFs would be developed as outlined under the Proposed Action; however, the ore processing facilities would include only the milling operations and production of the molybdenum sulfide concentrate. The TMO and FeMo portions of the processing facility would not be constructed, and as a result, the surface disturbance footprint would be approximately 20 acres less than under the Proposed Action. In addition, the leaching of the concentrate would likely not be done on site. The production of molybdenum sulfide concentrate would occur at an average rate of approximately 45.8 million pounds per year. This material would be stored at the Project Area in a concentrate storage structure adjacent to the mill. The molybdenum sulfide concentrate would be loaded from this storage facility into street legal haul trucks with covered containers and transported on the public transportation system to either an existing or new TMO facility. Employment, relative to the Proposed Action, would be reduced by approximately 30 individuals. Tax revenues would be similar to the Proposed Action over the 44-year life of this alternative.

2.2.4 Slower, Longer Project Alternative

Under this alternative the Project would operate at approximately one-half the production rate as described in the Proposed Action, which would result in a project that would last approximately twice as long as the Proposed Action.

Under this alternative, the currently planned 96 million short tons per year (st/y) mining rate would be reduced to 48 million st/y and the mill throughput would be reduced from 60,500 short tons per day (st/d) of ore to 30,250 st/d. Although salable Mo production on an annual basis would drop in half, the ultimate mine and associated waste and low-grade stockpiles, process plant, and tailing impoundments would still cover the same area, creating the same amount of disturbance. However, **some aspects of environmental disturbance (i.e., wildlife) would be greater due to the extended duration and impacts to additional springs.**

Under this alternative, smaller equipment than outlined under the Proposed Action would need to be purchased. Thus, the manufacture lead times for this new equipment may result in construction time frames that are longer than outlined in the Proposed Action, because the equipment is not yet available. This would also delay the commencement of operations of the Project. The Project production timeframe under this alternative would extend to at least 88 years.

It is likely that initial capital costs for this alternative would be reduced; however, this difference cannot be quantified without completing a re-design of the facilities. It is expected that sustaining capital costs would actually increase due to the much-extended operating life and operating cost (expressed as total cost per pound of production) would rise due to increased proportion of fixed costs and the higher per unit of ore variable costs of a smaller scale operation. More serious diseconomies of scale would affect the plant during the final two decades of production when

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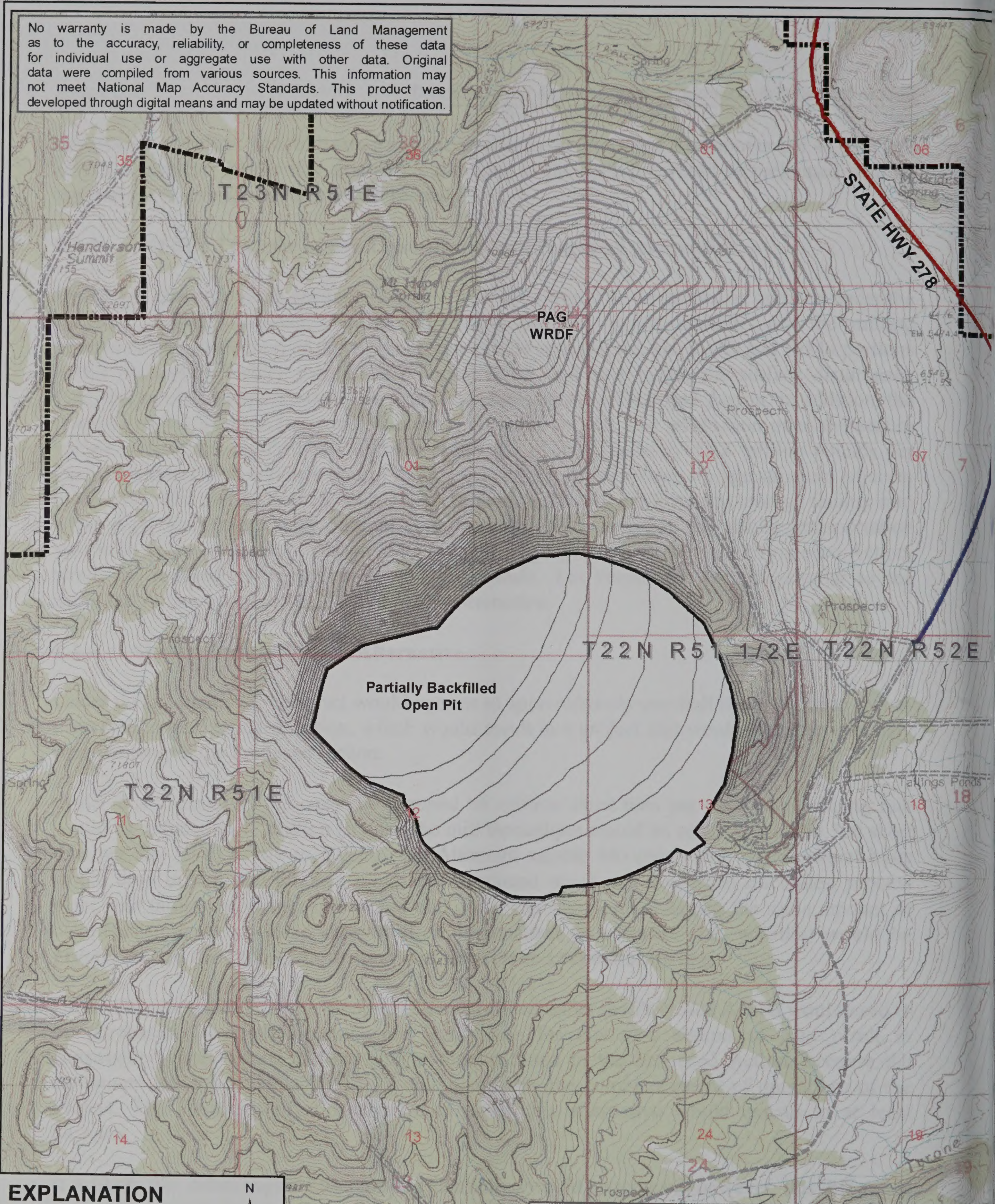

T23N R51E
STATE HWY 278
Henderson Summit
Mt Hope Spring
PAG WRDF
Prospects
Prospect
Partially Backfilled Open Pit
T22N R51 1/2E
T22N R52E
T22N R51E
Tailings Ponds
35
36
31
06
02
01
12
07
11
13
18
14
24
19

EXPLANATION

- Project Boundary
- ▭ Pit (50' Contours)
- Unpaved Road
- State Hwy 278
- Access Road

N

0 1,000 2,000 3,000 Feet

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

DESIGN:	EMLLC	DRAWN:	CVD/GSL	REVIEWED:	RFD
CHECKED:	-	APPROVED:	RFD	DATE:	05/02/2011
FILE NAME:	p1635_Fig2-2-1_PartialBackfillAlt.mxd				

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Partial Backfill Alternative

Figure 2.2.1

Mine operations are composed of a number of facility components. There can be alternative means and locations to implement these components in most settings. However, these alternative means are limited by the location of the mineral deposit, land and mineral ownership, and existing physical constraints, both natural and manmade. For the Proposed Action varying the location of a number of the proposed facilities is constrained by topographic features, existing transportation networks, surface ownership, **and** ore body location.

2.2.1 No Action Alternative

In accordance with BLM NEPA guidelines H-1790-1, Section 6.6.2 (BLM 2008a), the EIS evaluates the No Action Alternative. The objective of the No Action Alternative is to describe the environmental consequences that would result if the Proposed Action were not implemented. The No Action Alternative forms the baseline from which impacts of all other alternatives can be measured.

Under the No Action Alternative, EML would not be authorized to develop the Project and mine the Mount Hope ore body as currently defined under the Proposed Action. The No Action Alternative would result from the BLM disallowing the activities proposed under the Plan (EML 2006). However, EML would be able to continue exploration activities as outlined in previously authorized Notices. Refer to Section 1.3 for a discussion of the existing Notice level activities. The area would remain available for future mineral development or for other purposes as approved by the BLM. Any additional activities proposed within the area would be analyzed under their own site specific NEPA analysis at the time they are proposed.

2.2.2 Partial Backfill Alternative

Under this alternative, the Proposed Action would be developed as outlined in Section 2.1 and have the same surface disturbance footprint. However, at the end of the mining in the open pit, the open pit would be partially backfilled to eliminate the potential for a pit lake. The pre-mining ground water elevation in the vicinity of the open pit varies from northwest to southeast across the open pit from approximately 7,200 feet to 6,750 feet amsl. Therefore, the open pit would be backfilled to an elevation that varies from northwest to southeast across the open pit from approximately 7,300 to 6,850 feet amsl. The Partial Backfill Alternative addresses potential impacts associated with a pit lake that would develop under the Proposed Action as well as reduce the visual effects associated with the Proposed Action.

The backfilling would commence in Year 32 and be completed in approximately 13 years (95 million tpy). The partial backfilling would be accomplished by the same fleet and personnel that completed the mining, and as a result, employment would be approximately 370 employees through the end of ore processing (Year 44) with a reduced staffing from Year 44 through the completion of the partial backfilling (Year 45). The partial backfilling would be completed using approximately 1.3 billion tons of waste rock, which would comprise all the waste rock from the Non-PAG WRDF resulting in an elimination of the Non-PAG WRDF. This material would be removed from the completed WRDF and transported back to the open pit. The partial backfilling would need to be completed to an elevation that ranges across the open pit from 7,300 to 6,850 feet amsl. Figure 2.2.1 shows the configuration of the Project **following the completion of the backfilling and reclamation**. As a result of this alternative, the mining fleet and the associated employees would continue beyond the end of the mining sequence to complete the

2.2 Alternatives to the Proposed Action

The NEPA (42 U.S.C. 4322(E)) requires that an EIS "... study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." Section 6.6.1 of the BLM NEPA Handbook directs that a "...range of alternatives explore alternative means of meeting the purpose and need for the action. ... In determining the alternatives to be considered, the emphasis is on what is reasonable ... Reasonable alternatives include those that are practical or feasible from the technical or economic standpoint and using common sense..." In addition, EIS preparers are directed to "consult program-specific guidance for additional requirements on alternatives." Specific guidance for this **Final** EIS includes the BLM NEPA Handbook, BMDO guidance, and the regulations under 43 CFR 3809.

The analysis of alternatives in this EIS is based on the following criteria: a) public or agency concern; b) technical feasibility; c) potential to reduce an environmental impact of the Proposed Action; d) ability to meet the purpose of and need for the Proposed Action; and e) compliance with regulatory and legal guidance (i.e., **MMPA**). **In determining the alternatives to be considered, the BLM emphasizes what is "reasonable". Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint. Though not required, the BLM may elect to analyze in detail an alternative that might otherwise be eliminated from further analysis in order to assist in the planning or decision-making process.**

The Scoping Summary outlined comments received during public scoping, and included recommendations from commenters on alternatives to be analyzed in this EIS. The Scoping Summary is on file and available for review at the BLM's MLFO during normal business hours. Alternatives to the Proposed Action derived through the scoping process (internal and public) include the following:

- No Action;
- Different waste rock dump heights;
- Partial backfilling;
- Complete backfilling;
- Different powerline route;
- Different facility locations outside the Project Area;
- Different facility locations within the Project Area;
- Increased ore processing to match the mining schedule;
- Decreased mining to match the ore processing schedule;
- Reduced project;
- Slower, longer project; and
- Off-site transfer of ore concentrate for processing.

The following section of the EIS discusses alternatives to the Proposed Action and identifies four alternatives which are to be analyzed in the remainder of the EIS, in addition to the Proposed Action. The four alternatives include: the No Action Alternative; the Partial Backfill Alternative; the Off-Site Transfer of Ore Concentrate for Processing Alternative; and the Slower, Longer Project Alternative.

Under the Plan, buildings and structures would be dismantled, and materials would be salvaged or removed to the proposed landfill or other authorized landfill. Mill and processing infrastructure (pipes, tanks, and other conveyance/storage vessels) would be properly characterized and decommissioned. Concrete foundations and slabs would be broken using a track hoe mounted hydraulic hammer or similar method and buried in place under approximately three feet of material in such a manner to enhance storm water runoff and prevent storm water run-on and ponding. After demolition and salvage operations would be complete, the disturbed areas would be covered with approximately 12 inches of growth media and revegetated. Alternatively, buildings and structures may be left on private land in support of other industrial or commercial post-mining land uses.

All reagents and explosives would be removed for use as product at other mines, or appropriately disposed. Surface pipelines would be removed and salvaged or disposed. Underground pipeline ends would be capped and left in place. Unneeded utility poles would be cut off at ground level and removed. Materials removed from the site would be recycled, reused, or disposed of in a manner consistent with local, state, and federal regulations.

2.1.16.16 Surface Facilities or Roads not Subject to Reclamation

As determined by the BLM, roads on public lands suitable for public access or which continue to provide public access consistent with pre-mining conditions would not be reclaimed at mine closure. Narrower access roads may remain on large haul roads after they have been recontoured.

2.1.16.17 Drill Hole Plugging and Abandonment

Mineral exploration and development drill holes and monitoring and production wells subject to NDWR regulations would be abandoned in accordance with applicable rules and regulations (NAC 534.420, and 534.425 through 534.428). Boreholes would be sealed to prevent cross contamination between aquifers and the required shallow seal would be placed to prevent contamination by surface access (closure as per NAC 534.420).

Monitoring wells would be maintained until EML is released of this requirement by the NDEP or NDWR. These wells would then be plugged and abandoned according to the requirements of the State Engineer.

2.1.16.18 Concurrent Reclamation

Some of the Project facilities or portions of the Project facilities would be decommissioned prior to final mine closure. These areas would be reclaimed concurrently with the active mining operations.

Concurrent reclamation would take place on completed and inactive portions of the WRDFs as soon as would be practical and safe. Growth media stockpiles would be interim seeded following construction and the area reclaimed after the soil is used in reclamation.

For the ponds (or portions of the ponds) not planned to be converted into ET cells, liners would be cut, folded, or disposed of in the pond bottoms prior to backfilling and reclamation of the pond. These ponds or portions of ponds would be returned to a landform that is free draining and promotes post-closure revegetation through placement of an average of 12 inches of growth media.

The design of the WRDF foundation preparation and storm water control includes a geomembrane lined pond that would be constructed at the southeast toe of the LGO Stockpile area and would collect runoff/infiltration from the PAG WRDF and the LGO Stockpile area. After final reclamation of the PAG WRDF and removal of the LGO Stockpile area, this lined pond would be converted into an ET cell in a similar manner to the TSFs' underdrain ponds discussed above. Although infiltration flows from the PAG WRDF would not be anticipated during the active mine life, the ET cell would be designed to store and evaporate potential flows from infiltration during post-reclamation. The final design considerations of this ET cell would include observed and modeled infiltration flows during post-reclamation and a design to allow non-impacted surface runoff to bypass the ET cell design during higher flows from storm events and rapid snow melt.

Solids would be expected to be present in some quantity in the lined ponds at the time of reclamation and closure. Representative samples would be obtained to determine the chemical characteristics of the pond solids. Depending on the results of the characterization testing, the solids would be left in the ponds and buried in place, removed and placed in the tailings impoundment, or removed and placed in an approved landfill.

2.1.16.13 Constraints on Estimated Time to Complete Reclamation

The estimated time to complete reclamation assumes that average precipitation occurs during the years following reseeding. Periods of drought could delay revegetation, while excessive precipitation could increase tailings inventory evaporation times. With the exception of the TSFs and monitoring, reclamation activities would be expected to be completed within approximately three years after the end of processing activities. The North and South TSFs would be expected to take several years to drain and consolidate so that heavy equipment could recontour and reclaim the surface. The conceptual reclamation schedule is shown in Table 2.1-10.

2.1.16.14 Road Reclamation

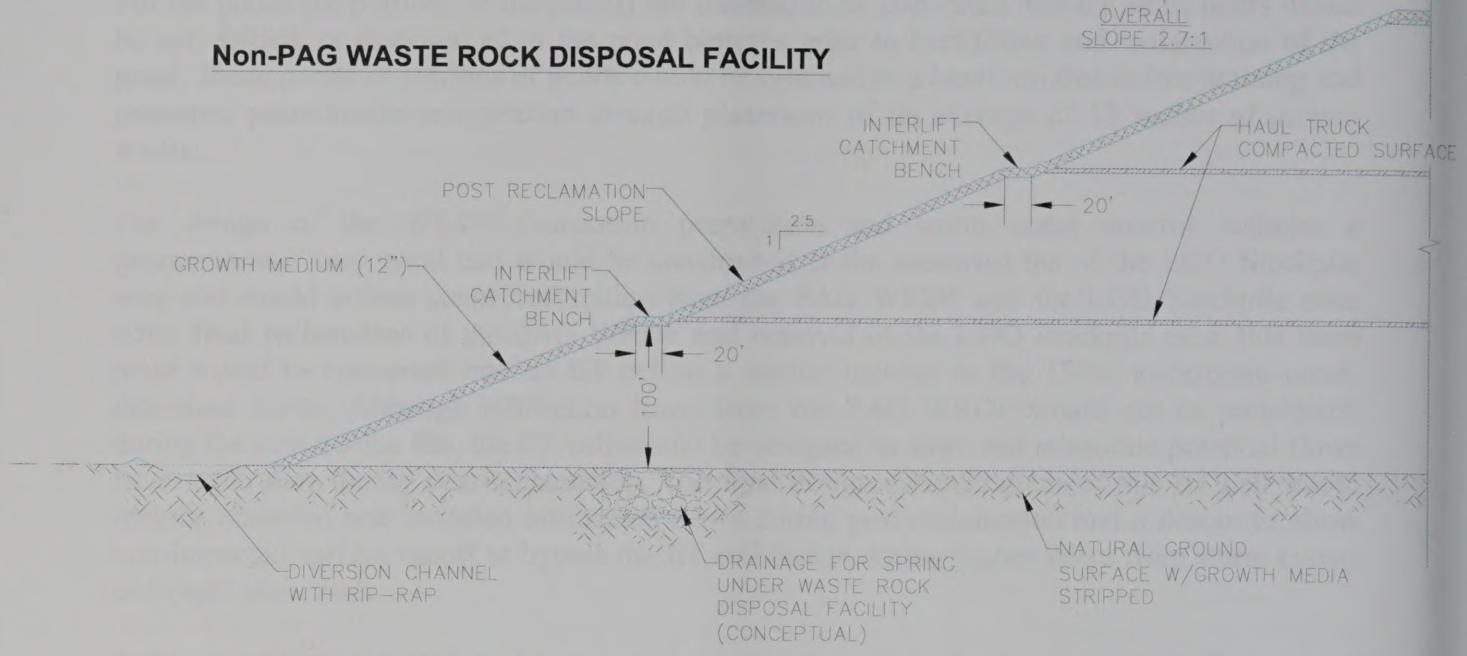
Roads would be recontoured or regraded to approximate the original contour, covered with soil/growth media, and reseeded. Asphalt roads and parking areas would be ripped and buried in place with at least 12 inches of growth media.

Some access roads would be needed to access monitoring points. As monitoring is completed and the facility is considered to be closed, the access roads would be reclaimed.

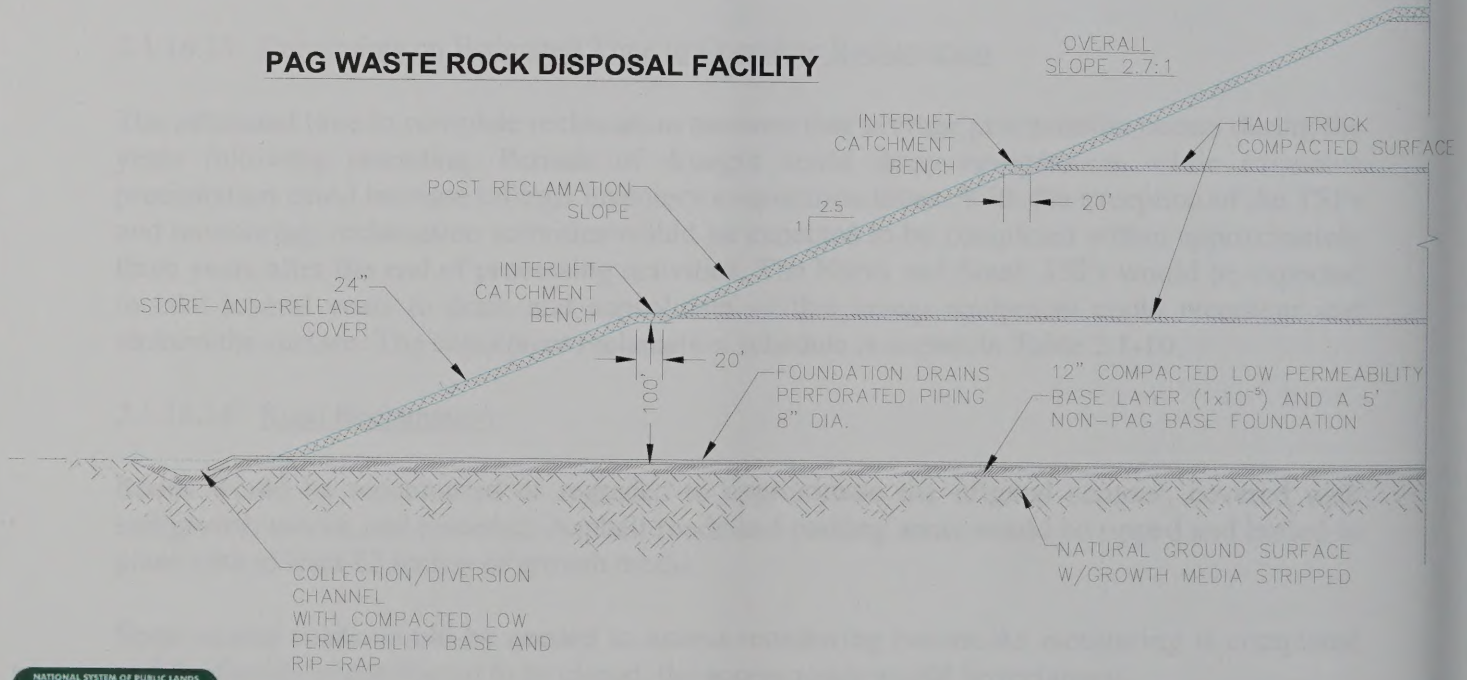
2.1.16.15 Disposition of Buildings and Ancillary Facilities

During final mine closure, new uses for the mine infrastructure may be found that would be in conformance with Eureka County's Economic Development Plan (see Section 2.1.16.4). However, 43 CFR 3809 currently requires the removal of all structures associated with the Plan.

Non-PAG WASTE ROCK DISPOSAL FACILITY


OVERALL SLOPE 2.7:1
INTERLIFT CATCHMENT BENCH
HAUL TRUCK COMPACTED SURFACE
POST RECLAMATION SLOPE
20'
2.5
1
GROWTH MEDIUM (12")
INTERLIFT CATCHMENT BENCH
20'
100'
DIVERSION CHANNEL WITH RIP-RAP
DRAINAGE FOR SPRING UNDER WASTE ROCK DISPOSAL FACILITY (CONCEPTUAL)
NATURAL GROUND SURFACE W/GROWTH MEDIA STRIPPED

PAG WASTE ROCK DISPOSAL FACILITY


OVERALL SLOPE 2.7:1
INTERLIFT CATCHMENT BENCH
HAUL TRUCK COMPACTED SURFACE
POST RECLAMATION SLOPE
2.5
1
20'
24" STORE-AND-RELEASE COVER
INTERLIFT CATCHMENT BENCH
20'
100'
FOUNDATION DRAINS PERFORATED PIPING 8" DIA.
12" COMPACTED LOW PERMEABILITY BASE LAYER (1x10⁻⁵) AND A 5' NON-PAG BASE FOUNDATION
COLLECTION/DIVERSION CHANNEL WITH COMPACTED LOW PERMEABILITY BASE AND RIP-RAP
NATURAL GROUND SURFACE W/GROWTH MEDIA STRIPPED

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Revision Date: 08/06/2012
Revised: CVD/GSL
Approved: RFD
Scale: **Not to Scale**
Project Number: **1635**
Drawing Name:p1635_Fig2-1-10&22_WRDFCrossSections.dwg

BUREAU OF LAND MANAGEMENT
MOUNT HOPE PROJECT

Post Reclamation Waste Rock Disposal Facility Cross Section

Figure 2.1.22

lined collection pond which would store runoff/infiltration from the PAG WRDF (PAG containing facility).

As areas of the WRDFs reach their ultimate configurations and become inactive, the storage area face would be regraded. The storage areas would generally be constructed in multiple lifts with typical heights of 100 feet and setbacks between lifts that would facilitate the grading to the final slope configuration with an interbench slope of 2.5H:1V or shallower, and a 20-foot wide bench at the toe of each regraded lift. These 20-foot wide benches, constructed every 100 feet vertically into the regraded slopes, would produce an overall average slope of 2.7H:1V from top to bottom and would be designed to reduce surface water flow velocities and subsequent erosion (Figure 2.1.**22**).

Once regraded, the surface of the Non-PAG WRDF would be covered with growth media to a depth of approximately 12 inches and seeded with the seed mixture selected from Table 2.1-8 or Table 2.1-9, or as determined at the time of reclamation through consultation with the BLM.

The PAG WRDF would be covered with two feet of growth media or cover material to minimize infiltration of meteoric water. Solution draining from the PAG WRDF would continue to be collected in the permanent drainage channel and used in process after the PAG WRDF is reclaimed, although solution flows would decrease due to placement of growth media or an ET layer. At closure of the mill, residual solution flows would be removed by evaporation. Specifics on the closure are outlined in the Plan (EML 2006) at Appendix 4.

2.1.16.11 Low-Grade Ore Stockpile Area

The former LGO Stockpile area would be cleared of any remaining material and reclaimed using the same methods as would be used for the ancillary facilities. These methods would include regrading for drainage, scarification, growth media placement, and seeding. If any material is still present at the time of closure, portions of the low-grade stockpile area that provide for containment for runoff and leachate from the low-grade material and storm water diversion would be retained. This area would then be covered and reclaimed in the same fashion as the PAG WRDF.

2.1.16.12 Reclamation of Ponds

Lined ponds, either process or non-process, subject to reclamation at the end of mine life include the South and North TSFs' underdrain ponds, mill process pond, the coarse ore stockpile pond and the LGO stockpile area/PAG WRDF collection pond.

Preliminary estimates of draindown rates from the South and North TSFs indicate that the underdrain collection ponds associated with each TSF would be needed during active and long-term fluid management as shown in Section 2.1.16.8.3. During closure of the TSFs and the active and passive fluid management period, each underdrain collection pond would be converted into an evaporation pond as discussed in Section 2.1.16.8.4. As previously discussed, partial reclamation of the evaporation ponds would take place as active fluid management transitions to passive fluid management. Upon completion of the passive evaporation period, the underdrain/evaporation ponds would be converted into ET cells to accommodate long-term tailings draindown.

- Installation of soil or geomembrane covers over the TSFs to limit infiltration; and
- Installation of semi-passive evaporative cells to handle mid-term and long-term remaining flows.

At the time of facility closure, tailings drainage would dictate a regime of active and passive evaporation within downstream evaporation cells and the tailings decant pool. As the water is removed from inventory, portions of the tailings facility would be armored and covered with soil from the embankment toward the decant pool. Once inventories would be low enough to be handled through evaporation at the lined cells below the embankment, the remainder of the TSF would be covered as described in Section 2.1.16.8.3. This design would limit infiltration and would also provide for contained evaporation of storm water runoff from the covered TSF. This design limits the potential for failure due to runoff management structures (e.g., spillway, **settling** basin, etc.).

Effectively, four phases of evaporation would be required throughout the closure process, with blending of strategies from each phase to the other:

- Active evaporation at the downstream evaporation ponds and recirculation and evaporation at the tailings surface;
- Active and passive evaporation at the evaporation cells;
- Passive evaporation at the evaporation cells only; and
- Long-term passive evaporation using ET cells.

This approach acknowledges the initially high drainage rates and the need to first prevent any release from the system, while effectively eliminating inventory at maximum drainage rates from the tailings. Also, as evaporation at the tailings surface would result in reduced infiltration into tailings, the tailings surface evaporation system would be eliminated first in preference for the downstream active evaporation within the lined ponds. Finally, the active management would be phased out by improving the tailings cover and eliminating residual draindown to a level that can be handled by passive systems. The passive systems would then be partially reduced in size over time as flows reach steady state. **EML would explore and evaluate the technical and regulatory feasibility of recycling, injecting, discharging, or otherwise using the water stored in the tailings pond at the end of the Project life to prevent the potential waste of this resource, as opposed to disposal by evaporation.**

2.1.16.10 Reclamation of Waste Rock Disposal Facilities

The WRDFs would be reclaimed to meet certain general objectives including: reduced slope erosion, mass stability, rounded edges, and revegetated surfaces that would be similar to surrounding topographic features. Reclamation of the WRDFs would be conducted concurrently with regular mine operations to the extent reasonable.

An engineering design report has been prepared by SWC and is included in the Plan (EML 2006, Appendix 3). The report covers the foundation preparation and storm water control structures for developing the WRDFs. This report provides detailed conceptual designs of storm water control structures to divert and manage flows for exposed waste rock and reduce runoff into disturbed areas with upstream diversion structures. This report also provides a design for a geomembrane would be sited in the supernatant pond depressions of each TSF. These evaporation ponds would be constructed within the TSFs impoundment footprints after sufficient consolidation and drying of the tailings has occurred. These evaporation ponds would be designed to function as artificial playas to temporarily capture runoff from meteoric water and allow this water to evaporate.

The evaporation ponds were sized to contain average monthly precipitation plus the 100-year, 24-hour storm event runoff volume over the impoundment footprint areas. Direct runoff volumes were calculated using the Natural Resource Conservation Service's (NRCS's) National Engineering Handbook, Part 630 Hydrology, Chapter 10 Procedure. The input requirements for this method consist of rainfall amount, drainage area, and curve number (CN).

Construction of the South and North TSFs' evaporation ponds or artificial playas would consist of placing geomembrane on the tailings surface depression created at the end of deposition. The geomembrane in the artificial playa areas would be covered with an 18 inch layer of dried tailings to serve as a protective cover. Once the geomembrane is covered with tailings, an 18-inch layer of growth media would be placed over the artificial playa surface. To contain the runoff volume from average monthly precipitation plus the 100-year, 24-hour storm event, the South TSF artificial playa would have a pond area of approximately 115 acres and a storage capacity of approximately 86 million gallons at a maximum depth of eight feet. The artificial playa for the North TSF would have an area of approximately 58 acres and have a storage capacity of approximately 30 million gallons at a maximum depth of 5.7 feet. The remaining tailings impoundment surfaces (outside of the playa footprint) would be covered with a 24-inch layer of growth media placed on a stabilized tailings surface. Mine rock used for the impoundment cover would be hauled directly from the Non-PAG WRDF.

Growth media used for the impoundment covers would come from stockpiles sited adjacent to the TSFs and containing growth media excavated from the facility footprint areas during construction.

After the mine rock and growth media covers have been placed, the South and North TSFs' impoundment areas would be reseeded.

2.1.16.9.4 TSF Fluid Management

At the end of mining operations, the TSFs would be anticipated to draindown fluid inventories for more than 30 years, and would thereafter provide a residual drainage from surface infiltration into the foreseeable future. The final management of the draindown fluid would depend on the water quality and other site-specific environmental factors, and would be required by NAC 445A.430 to be closed in a manner that does not degrade waters of the state. Specifics on the closure are outlined in the Plan (EML 2006) at Appendices 4 and 6.

The fluid management assumption estimates for the TSFs at the end of Project operations are shown in the Plan (EML 2006, Appendix 11). The draindown rate for the TSFs at Day 1 of Year 44 would be estimated at approximately 3,650 gpm.

The core approach to long-term closure would include two primary technologies:

The general operational strategy of the South and North TSFs in preparation for final closure is to maintain perimeter deposition for the life of the mine. This method of tailings placement would provide an average 0.7 percent impoundment slope from the embankment to the supernatant pond.

2.1.16.9.1 Embankments

Tailings distribution pipelines and conveyance and distribution systems remaining on the TSF embankments at the end of operations would be removed to prepare for final earthworks reclamation. Since the downstream TSF embankments would be constructed at a 3H:1V slope, no additional regrading would be necessary. Minor regrading of the 30-foot wide access roads on the embankment crests would be needed to remove the safety berm used for vehicle/equipment access during operations.

The reclamation plan for the tailings embankments requires an 18 inch layer of growth media to be placed over the entire embankment surface. This growth media for the embankment covers would come from borrow areas sited adjacent to the TSFs or stockpiled growth media excavated from the facility footprint areas during construction. Growth media stockpile locations for the TSFs' reclamation activities are shown on Figures 2.1.1, 2.1.3, and 2.1.5. The final configurations of the South and North TSFs' embankments would have an overall slope of 3H:1V. After growth media placement, the embankments would be revegetated.

2.1.16.9.2 Removal of Tailings Conveyance and Distribution System

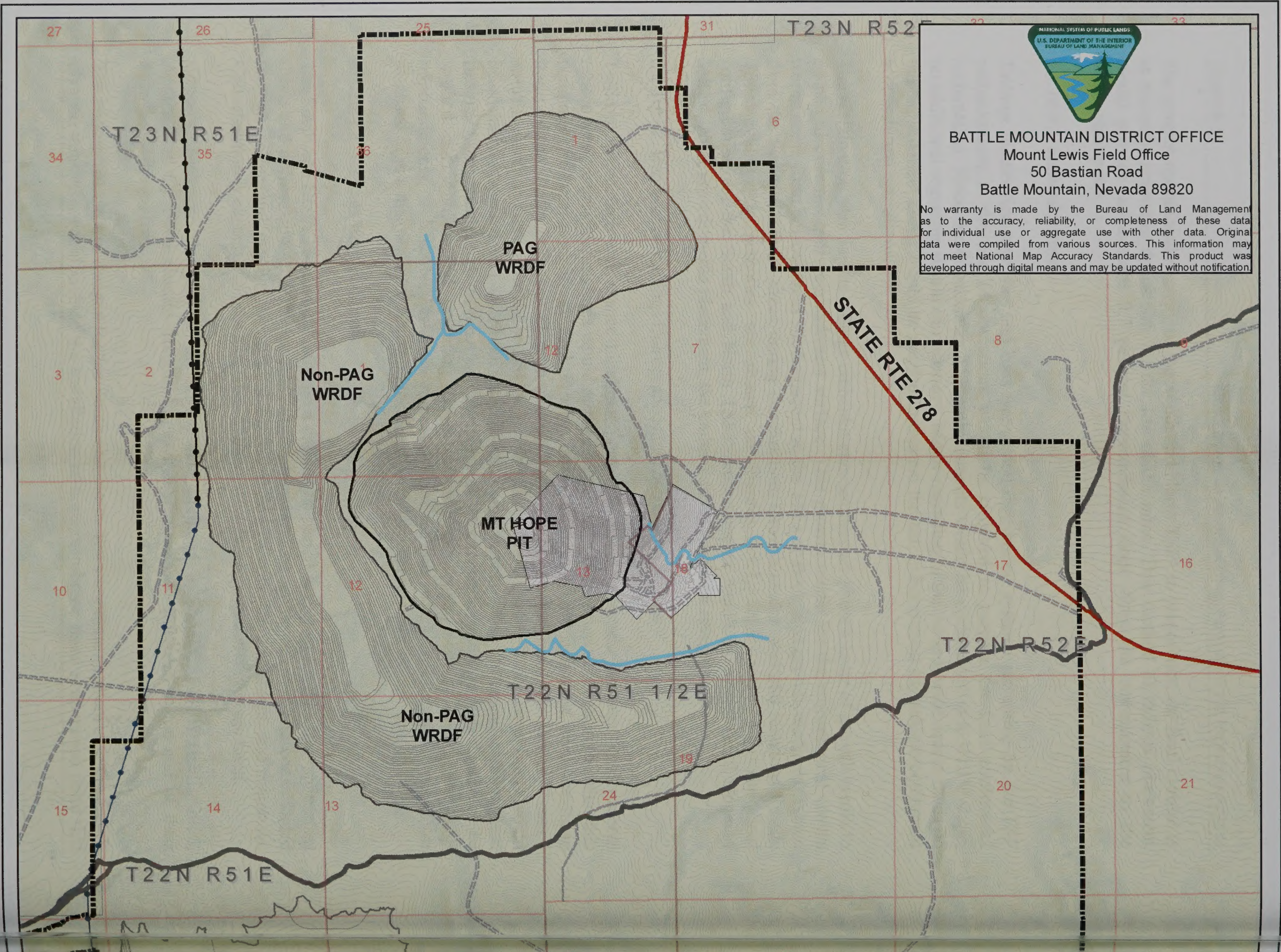
Tailings and reclaim conveyance pipelines, pumps, cyclone equipment and any other process related equipment and structures would require some level of characterization to ensure that this equipment is clean prior to removal. Process related equipment and structures would be those items which come into contact with process solution or process reagents. Process related structures and equipment would be rinsed prior to removal or disposal. These components would be visually inspected and tested to identify remaining contaminants following cleaning and rinsing. Components such as HDPE pipe that contain excessive solids, which could not be washed out with normal operating flows, would be buried in place within the TSF impoundments, if feasible. Materials removed from the site would be recycled, reused, or disposed of in a manner consistent with local, state, and federal regulations.

2.1.16.9.3 Tailings Impoundment

The South and North TSFs would undergo a draindown period during which time the supernatant fluids and tailings slimes in the supernatant pond depressions would be dried and consolidated through active and passive evaporation to enable safe access for equipment and materials. Consolidation is expected to take a number of years while seepage is actively evaporated.

Conceptual closure designs for the TSFs were prepared by AMEC (2010) (EML 2006, Appendix 14-C). Final closure designs for each TSF would be provided at the end of their operational design life.

The conceptual closure designs for the South and North TSFs impoundment areas at the end of planned mine life would include the installation of a geomembrane lined evaporation pond that



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NATIONAL SYSTEM OF PUBLIC LANDS
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
T23N R52E
T23N R51E
T22N R52E
T22N R51 1/2E
T22N R51E
STATE RTE 278
PAG WRDF
Non-PAG WRDF
Non-PAG WRDF
MT HOPE PIT
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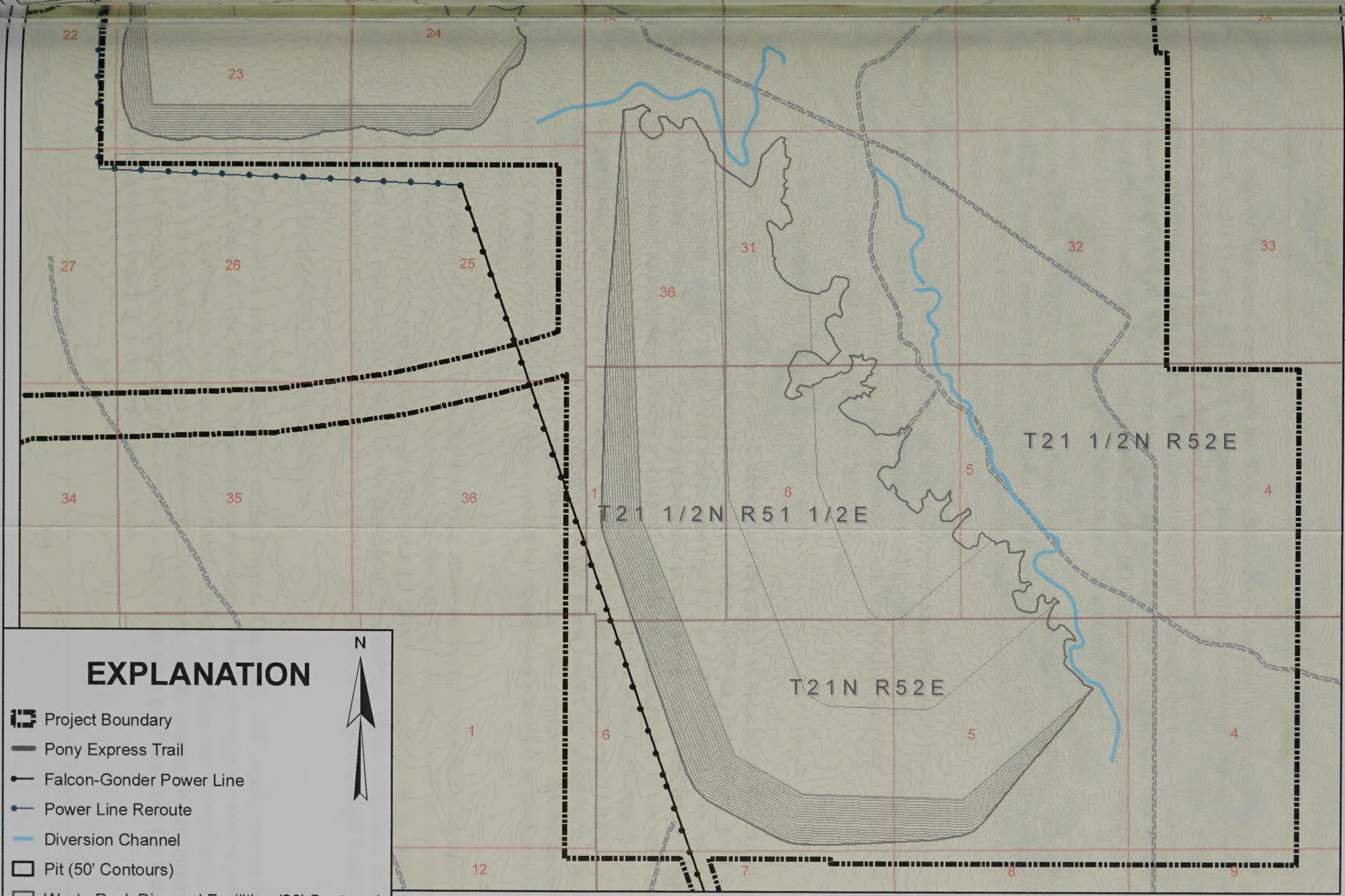
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T21N R52E
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EXPLANATION

- ▭ Project Boundary
- — Pony Express Trail
- •— Falcon-Gonder Power Line
- •— Power Line Reroute
- — Diversion Channel
- ☐ Pit (50' Contours)
- ☐ Waste Rock Disposal Facilities (20' Contours)
- ☐ Tailing Storage Facilities (20' Contours)

Land Status

- 🟨 Bureau of Land Management
- ☐ Private

0 0.5 1 Miles

DESIGN:	EMLLC	DRAWN:	CVD/GSL	REVIEWED:	RFD
CHECKED:	-	APPROVED:	RFD	DATE:	08/06/2012
FILE NAME:	p1635_Fig2-1-21_PostMiningTopography.mxd				

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MOUNT HOPE PROJECT

DRAWING TITLE:

Post MiningTopography (Year 80 and Beyond)

Figure 2.1.21

soils survey has been completed by SRK (SRK 2006) to provide an inventory of available growth media (Table 2.1-7). This inventory has been utilized to estimate the likely mix of growth media available and to allow a detailed evaluation of the site-specific stability of the proposed major reclamation components. The characteristic of each soil type and estimated recovered volume was used on a weighted average basis to determine potential soil loss on the WRDFs using the Revised Uniform Soil Loss Equation (RUSLE2). The WRDFs and LGO Stockpile would be designed with 100-foot high benches and 20-foot setbacks.

Results of the RUSLE2 analyses indicate that the reclaimed surfaces with vegetative cover exhibit a range of erosion rates due to the characteristics of the different soils. Adding controls such as dozer tracking and contour furrowing would limit sheet flow erosion on the WRDF surfaces.

The analyses and recent similar experience at other Nevada mines indicate that the use of erosion control BMPs during reclamation activities would greatly reduce the sediment migration from the facilities until vegetation can be established. EML would maintain BMPs at the base of those reclaimed slopes until vegetation has established.

2.1.16.8 Reclamation of Open Pit

Mining the open pit would result in an excavation to a depth of approximately 2,300 feet below the existing water table, which would be approximately 2,640 feet beneath the natural surface. Open pit slopes would range from approximately 41° to 49°, depending on rock type and geotechnical considerations. Ongoing geotechnical and slope movement monitoring studies would be used to evaluate the safety of open pit wall slopes. Reclamation of the open pit would include construction of a pit perimeter berm to prevent vehicular access and deter livestock. This pit perimeter berm would be constructed with 1.5H:1V side slopes and have a height of six feet and a base width of 18 feet. After construction, this berm would be revegetated. Post-mining open pit wall modifications to decrease slope angles are not proposed. **Disturbance in the Interpit Area not covered by the berms would be ripped and scarified to prepare a seedbed prior to seeding.**

The slope angles of the open pit walls would not allow soil replacement and revegetation due to access logistics and safety concerns. Some of the open pit floors would be expected to be covered by water as the pit lake develops. The open pit floors and ramps would be expected to be competent rock surfaces that would be stable without reclamation. These areas have little or no potential to support vegetation. There are no plans to revegetate within the open pit footprint.

2.1.16.9 Reclamation of Tailings Facilities

Two TSFs would be constructed as part of the Project. The South TSF would operate between startup and Year 36. The North TSF would operate from Year 36 through the end of processing (Year 44). In general, reclamation activities would consist of drainage and consolidation of the tailings to allow access by heavy equipment. Earthwork would consist of recontouring the surface of the tailings impoundment to create a central short-term pool and keep the water from ponding on the beach or at the embankment face.

- Mimic surrounding regional landscape vegetative and nonvegetative (i.e., rock outcrop, scree, and talus) component patterns; and
- Maintain public safety by stabilizing or limiting access to landforms that could constitute a public hazard.

2.1.16.6 Post-Mining Contours and Topography

The final grading plan for the Project is designed in part to minimize the visual impacts of the disturbance proposed by EML. Slopes would be regraded to blend with surrounding topography, interrupt straight line features and facilitate revegetation. Where feasible, large constructed topographic features, such as the WRDFs and TSFs may have rounded crests and variable slope angles to resemble natural landforms. The open pit would remain as a large depression, partially filled with water. A post-reclamation topographic map is provided as Figure 2.1.**2**1.

2.1.16.7 Final Gradient Slope Stability Criteria

2.1.16.7.1 Open Pits

The walls of the open pit would generally have an overall slope of 41° to 49°. Actual slope angles would be subject to engineering studies, conditions encountered during actual mining operations, and MSHA regulations and guidelines. Additional studies are ongoing to refine the pit stability predictions.

Operational and post-closure open pit slope configurations would be controlled by several parameters that include the geometry of the ore body, geologic and geotechnical characteristics of the host rock, equipment constraints, and safe operating practices.

2.1.16.7.2 Waste Rock Disposal Facilities

Slope stability analyses examined the stability of the PAG and Non-PAG WRDFs and the LGO Stockpile under both static and seismic loading conditions. Appendix 3, Part A in the Plan (EML 2006) presents the WRDF stability analyses. The results of the analyses indicate that the WRDFs and LGO Stockpile would be stable for all conditions analyzed.

2.1.16.7.3 Tailings Storage Facility

Slope stability analyses were conducted in support of the conceptual design of the TSF embankments (AMEC 2009). For a water impoundment facility, the desired minimum static factor of safety required by the Nevada Division of Water Resources (NDWR) is typically 1.4 for static conditions. As shown in the assessment, the proposed facility is stable under static loading conditions since the computed values exceed the prescriptive factors of safety. The static factor of safety for the ultimate (full build out) tailings facility was determined to be 2 and 1.4 for the circular and block failure models, respectively.

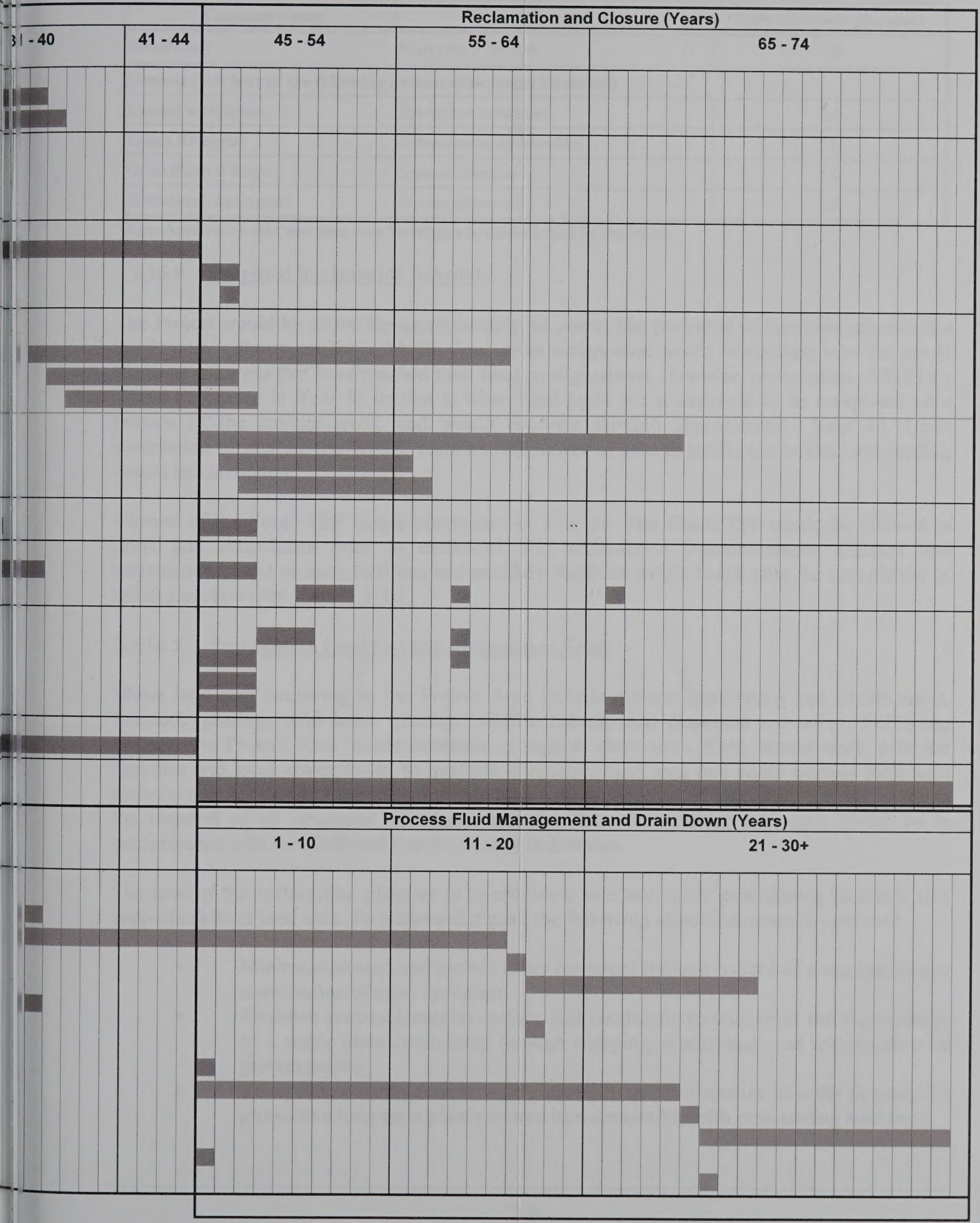
2.1.16.7.4 Erosional Stability

Soils salvaged from mine facility footprints as well as some of the near surface alluvial material mined from the open pit would be used as soil cover materials during reclamation. A detailed

Table 2.1-10 Conceptual Reclamation Schedule

MINE COMPONENT	Mining and Milling Operations (Years)																													
	1 - 10										11 - 20										21 - 30									
Open Pit																														
Pit Safety Berm Construction																														
Pit Safety Berm Revegetation																														
Waste Rock Disposal Facilities																														
Regrading								▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨					
Growth Media Application								▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		
Revegetation								▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨		
Low-Grade Ore Stockpile																														
LGO Processing																														
Growth Media Application of LGO Footprint																														
Revegetation of LGO Foot-print																														
Tailings Storage Facilities																														
South TSF																														
Tailings Consolidation																														
Earthworks and Conceptual Cover Placement																														
Revegetation																														
North TSF																														
Tailings Consolidation																														
Earthworks and Conceptual Cover Placement																														
Revegetation																														
Mill Facilities																														
Buildings/Structure Demolition & Removal																														
Haul & Access Roads																														
Haul Roads Earthwork/Revegetation																														
Access Roads Earthwork/Revegetation																														
Ancillary Facilities																														
Growth Media Stockpiles																														
Borrow Pits																														
Sediment Control Structures																														
Utility Corridors																														
Exploration																														
Regrading/Revegetation																														
Reclamation Monitoring[1]																														
PROCESS COMPONENT																														
Process Fluid Management																														
South TSF Process Fluid Management																														
IFM and Phase I Fluid Management																														
Phase II Fluid Management																														
Phase III Fluid Management																														
Phase IV Fluid Management																														
South TSF Evaporation Pond Construction																														
South TSF ET Cell Conversion/Construction																														
North TSF Process Fluid Management																														
IFM and Phase I Fluid Management																														
Phase II Fluid Management																														
Phase III Fluid Management																														
Phase IV Fluid Management																														
North TSF Evaporation Pond Construction																														
North TSF ET Cell Conversion/Construction																														

[1] Reclamation monitoring includes five years of monitoring of the PAG WRDF for seepage.


Reclamation and Closure (Years)
- 40
41 - 44
45 - 54
55 - 64
65 - 74
Process Fluid Management and Drain Down (Years)
1 - 10
11 - 20
21 - 30+

Common Name	Species	Pure Live Seed (lb./acre)
Sweetvetch	*Hedysarum boreale*	2.0
Grasses (Use four of the following grasses at the rates identified)		
Crested wheatgrass	*Agropyron cristatum*	2.0
Indian Ricegrass	*Achnatherum hymenoides*	2.0
Great Basin wildrye	*Leymus cinereus*	2.0
Bottlebrush squirreltail	*Elymus elymoides*	2.0

Note: Application mix and rates may be subject to modification by the BLM.

2.1.16.4 Proposed Reclamation Schedule

The Project would be active for approximately 44 years. The projected reclamation schedule for the Project is shown on Table 2.1-10. Concurrent reclamation would be ongoing over the life of the mine for areas that have reached their final configurations. However, reclamation of WRDFs would be started in Year 15 as that is when final build out is expected to be completed on a portion of the storage areas, and would continue through approximately Year 40. Upon completion of mining, the WRDF recontouring, cover or growth media placement, and seeding would be completed.

Closure of the South TSF would commence in Year 36. The South TSF would be allowed to drain and consolidate prior to earthwork and reclamation commencement. Closure and reclamation of the process facilities and ancillary facilities would begin after the completion of milling as shown on Table 2.1-10.

2.1.16.5 Post-Mining Land Use and Reclamation Goals

Major land uses occurring in the Project Area include mineral exploration and development, livestock grazing, wild horse grazing, wildlife habitat, and dispersed recreation. Following closure, the Project Area would continue to support these uses. EML would work with the agencies and local governments to evaluate alternative land uses that could provide long-term socioeconomic benefits from the mine infrastructure; however, 43 CFR 3809 currently requires the removal of all structures associated with the Plan. Post-closure land uses would be in conformance with the RMP and Eureka County ordinances.

The goal of the reclamation program is to provide a safe and stable post-mining landform that supports defined land uses. To achieve this goal, the following objectives would be pursued:

- Minimize erosion and protect water resources through control of water runoff and stabilization of mine facilities;
- Establish post-reclamation surface soil conditions conducive to the regeneration of a stable plant community through stripping, stockpiling, and reapplication of growth media;
- Revegetate disturbed areas with a diversity of plant species in order to establish productive long-term plant communities compatible with post-mining land uses;

results of reclamation in other areas of the mine, concurrent reclamation, revegetation test plots, or changes by the BLM in its seed mixture requirements.

Table 2.1-8: Seed Mix for Elevations Above 7,500 Feet Above Mean Sea Level

Common Name	Species	Pure Live Seed (lb./acre)
Shrubs (Use four of the following shrubs at the rates identified)		
Snowberry	*Symphoricarpos* sp.	4.0
Serviceberry	*Amelanchier* sp.	4.0
Antelope bitterbrush	*Purshia tridentata*	8.0
Curl-leaf mountain mahogany	*Cercocarpus ledifolius*	8.0
Currant	*Ribes* sp.	0.5
Forbs (Use two of the following forbs at the rates identified)		
Yarrow	*Achillea* sp.	0.1
Palmer penstemon	*Penstemon palmeri*	0.25
Lewis flax	*Linum lewisii*	1.0
Arrowleaf balsamroot	*Balsamorhiza sagittata*	2.0
Common sainfoin	*Onobrychis viciifolia*	6.0
Cinquefoil	*Potentilla simplex*	0.1
Small burnet	*Sanguisorba minor*	4.0
Grasses (Use four of the following grasses at the rates identified)		
Idaho Fescue	*Festuca idahoensis*	1.0
Indian Ricegrass	*Achnatherum hymenoides*	1.0
Orchard grass	*Dactylis glomerata*	0.5
Great Basin wildrye	*Leymus cinereus*	1.0
Bluebunch wheatgrass	*Pseudoroegneria spicata*	1.0
Sandberg bluegrass	*Poa secunda*	0.5
Mountain brome	*Bromus carinatus*	2.0

Note: Application mix and rates may be subject to modification by the BLM.

Table 2.1-9: Seed Mix for Elevations between 5,500 and 7,500 Feet Above Mean Sea Level

Common Name	Species	Pure Live Seed (lb./acre)
Shrubs (Use four of the following shrubs at the rates identified)		
Wyoming big sagebrush	*Artemisia tridentata* ssp. *wyomingensis*	0.1
Fourwing saltbush	*Atriplex canescens*	2.0
Spiny hopsage	*Grayia spinosa*	1.0
Forage kochia	*Bassia prostrate*	0.25
Nevada Mormon tea	*Ephedra nevadensis*	4.0
Forbs (Use two of the following forbs at the rates identified)		
Scarlet globemallow	*Sphaeralcea coccinea*	0.5
Palmer penstemon	*Penstemon palmeri*	0.5
Lewis flax	*Linum lewisii*	1.0

Soil Type	Soil Depth (in.)	Area (Acres)/ Volume (yd^3)	Facility								Totals
			Waste Rock Stockpile PAG	Waste Rock Stockpile Non-PAG	Inter Pit	Mount Hope Pit	North Tailings Facility	Plant/ Admin/ Yards	South Tailings Facility	Temp Low-Grade Ore Stockpile*	
Depth											
Total Required at 18" Depth		Volume									
Total Required at 24" Depth		Volume	1,819,840				2,836,240		7,679,467	1,345,520	13,681,067
Total Required		Volume									16,922,253

In the case that LGO is still present at the time of closure, two feet of cover material would be placed on the stockpile.

AT - Atrypa assoc. - Atrypa gravelly loam, slopes 15 to 30 percent - Atrypa loam, slopes four to 15 percent.
LK - Labshaft-Rock outcrop complex - Labshaft stony loam, slopes 15 to 30 percent - Rock outcrops.
MAE - Mau stony loam, slopes 15 to 30 percent.
RAC - Ratto - Ratto gravelly fine sandy loam, slopes two to eight percent.
RHC - Ruby Hill - Ruby Hill fine sandy loam, slopes two to eight percent.
321 - Mau-Shagnasty-Eightmile assoc. - Mau stony loam, slopes 15 to 30 percent - Shagnasty very stony loam, slopes 15 to 30 percent - Eightmile very gravelly loam, slopes 15 to 30 percent.
440- Kercan loam, slopes zero to two percent.
600 - Ruby Hill - Ruby Hill sandy loam, slopes zero to four percent.
681 - Chad-Cleavage-Softscrabble assoc. - Chad cobbly loam, slopes 15 to 30 percent - Cleavage gravelly loam, slopes eight to 15 percent - Softscabble stony fine sandy loam, eight to 15 percent slopes.
770 - Welch loam, drained, slopes zero to four percent.
764 - Shagnasty-Ravenswood-Rock outcrop assoc. - Shagnasty extremely stony loam, slopes 30 to 50 percent - Ravenswood extremely stony loam, slopes 30 to 50 percent - Rock outcrop.
830 - Atrypa - Atrypa gravelly loam, slopes 30 to 50 percent.
831 - Atrypa-Mau assoc. - Atrypa gravelly loam, slopes 15 to 30 percent.
922 - Handy - Handy loam, 2 to 8 percent slopes

Reclamation Growth Media Depths
Temp. LGO Stockpile 24"
PAG WRDF 24"
Tailings Facilities, Embankment and impoundments 18"
Non-PAG WRDF 12"
Plant/Admin/Yards 12"
Pit 0"
Inter Pit 0"

Table 2.1-7: Soil Inventory and Projected Requirements

Soil Type	Soil Depth (in.)	Area (Acres)/ Volume (yd^3)	Facility								Totals
			Waste Rock Stockpile PAG	Waste Rock Stockpile Non-PAG	Inter Pit	Mount Hope Pit	North Tailings Facility	Plant/ Admin/ Yards	South Tailings Facility	Temp Low-Grade Ore Stockpile*	
AT	13	Area	199	0	20	0	0	0	0	0	219
		Volume	347,808	0	34,956	0	0	0	0	0	382,763
LK	19	Area	0	244	20	110	79	5	712	0	1,170
		Volume	0	623,284	51,089	280,989	201,801	12,772	1,818,764	0	2,988,700
RAC	29	Area	303	336	16	60	0	289	0	327	1,331
		Volume	1,181,363	1,310,027	62,382	233,933	0	1,126,779	0	1,274,937	5,189,421
RHC	21	Area	0	0	0	0	0	0	1,668	0	1,668
		Volume	0	0	0	0	0	0	4,709,320	0	4,709,320
MAE	34	Area	62	4	140	448	0	33	0	90	777
		Volume	283,409	18,284	639,956	2,047,858	0	150,847	0	411,400	3,551,753
321	34	Area	0	83	24	53	0	0	0	0	160
		Volume	0	379,402	109,707	242,269	0	0	0	0	731,378
440	60	Area	0	0	0	0	32	0	0	0	32
		Volume	0	0	0	0	258,133	0	0	0	258,133
600	21	Area	0	0	0	0	66	0	0	0	66
		Volume	0	0	0	0	186,340	0	0	0	186,340
681	14	Area	0	175	17	36	0	0	0	0	228
		Volume	0	329,389	31,998	67,760	0	0	0	0	429,147
764	13	Area	0	262	14	27	0	0	0	0	303
		Volume	0	457,918	24,469	47,190	0	0	0	0	529,577
830	14	Area	0	397	11	0	95	0	0	0	503
		Volume	0	747,242	20,704	0	178,811	0	0	0	946,758
831	14	Area	0	0	0	0	607	0	0	0	607
		Volume	0	0	0	0	1,142,509	0	0	0	1,142,509
922	9	Area	0	181	0	0	0	0	0	0	181
		Volume	0	219,010	0	0	0	0	0	0	219,010
Total Salvaged*		Area	564	1,682	262	734	879	327	2,380	417	7,245
		Volume	1,631,322	3,676,101	877,734	2,915,428	1,770,835	1,161,358	5,875,276	1,517,703	19,138,328
Total Required at 12"		Volume		2,713,627				527,560			3,241,187

included in the LTFM because the pit lake is a hydrologic sink and therefore would not impact the quality of the surrounding ground water. Monitoring costs during operations and the 30-year closure period would be covered in the reclamation financial guarantee, and if information collected during this period indicates the need, the LTFM may be adjusted. Maintenance of ET cells that would be constructed to manage long-term draindown from the TSFs and the PAG WRDF could include replacing the backfill. However, the ET cells would be designed simply to provide containment of draindown solution as it evaporates and backfill that would function as growth media for vegetation. Over long time periods, salts in the draindown solution that precipitate within the backfill could completely occupy the media pore space, affecting the viability of vegetation. The ET cells would continue to provide containment by means of its synthetic liner, and solution draindowns would decrease over time, reducing the amount of solution volume that would need to be contained. As stated previously, the maintenance specifics and costs would be determined in cooperation with the BLM. Based on further monitoring and evaluation, additional mitigation measures and funding requirements can be implemented at any time if conditions warrant. EML would remain financially responsible for any additional mitigation that might be required.

2.1.16.2 Growth Media/Soil Balance

A preliminary growth media balance for the Project, shown in Table 2.1-7, indicates approximately 19 million yd^3 of material could be salvaged from the disturbed areas. Table 2.1-7 also shows the volumes needed to cover the facilities at 12, 18, and 24 inches. Specifics on the soil types are discussed in Section 3.5. Alluvium is also considered to be suitable growth media; where the term "growth media" is used, it should be understood that alluvium is included in addition to topsoil. Growth media management is addressed in the **GMMP** (EML 2006, Appendix 10). The growth media material balance indicates the recovered growth media volumes would be adequate to provide the proposed cover amounts. Should a shortfall be experienced alluvium would be excavated below grade within the footprint of the growth media stockpile areas.

2.1.16.3 Revegetation, Seeding, and Planting

Reclaimed surfaces would be revegetated to control runoff, reduce erosion, provide forage for wildlife and livestock, and reduce visual impacts. Seed would be applied with either a rangeland drill or with a mechanical broadcaster and harrow, depending upon accessibility. Seeding would take place after grading and growth media application of reclaimed areas. Noxious weeds would be controlled as outlined in Section 2.1.14.7.

Reclamation seed mixtures and application rates, based on BLM requirements, are shown in Tables 2.1-8 and 2.1-9. These mixtures would provide forage and cover species similar to the pre-disturbance conditions, facilitating the post-mining land uses of livestock grazing and wildlife habitat. In addition, these seed mixes have been determined based on the species' ability to grow within the constraints of the low annual precipitation experienced in the region, its suitability for site aspect, and the elevation and soil type.

The proposed seed mixture and application rates would be subject to modification by the BLM. The actual seed mixture and application rates would be determined prior to seeding based on the

3809.401(b)(4), and applicant committed practices outlined for water resources, an advisory committee would be established as described in the water resources monitoring plan (Appendix C). Eureka County would be invited to participate on this advisory committee. The establishment of the advisory committee would allow participants to review the monitoring reports, meet on a periodic basis and comment on monitoring results.

The overall goals and objectives of the advisory committee would be to review the monitoring protocols, data, and reports. The committee would meet on a periodic basis and make recommendations to the BLM on operational changes or compliance issues.

The establishment of the advisory committee would be based on an agreement subsequent to the issuance of a ROD and Plan approval. This agreement would be consistent with the approved Plan and mitigation identified in the EIS and would establish the roles and responsibilities of all parties involved.

2.1.16 Reclamation and Closure

Reclamation of disturbed areas resulting from activities outlined in the Plan would be completed in accordance with BLM and NDEP regulations. The Project disturbance areas are summarized in Table 2.1-1. The areas proposed for disturbance can be divided into the following: open pit; WRDFs; TSFs; utility corridors; borrow areas; growth media stockpiles; haul roads; buildings and yard areas around the mine; mill; TMO plant; administration; laboratory; and ancillary facilities. With the exception of the open pit, surface mine components would be reclaimed and revegetated.

EML would provide a reclamation financial guarantee in accordance with 43 CFR 3809.522 and 3809.553, as well as NAC 519A.380. Within three years following Plan approval and at least every three subsequent years, EML would update the guarantee to reflect the actual disturbance and whatever additional disturbance is planned for the Project phase anticipated over the next three-year period. Changes to equipment, consumables, and man power costs would also be incorporated during the updates.

2.1.16.1 Post-Closure Monitoring and Maintenance

EML would create a **L**ong-**T**erm **F**unding **M**echanism **(LTFM)** for the BLM to assure completion of long-term post-closure monitoring and mitigation obligations (after reclamation and financial guarantee release) of EML for the Project. The **LTFM** would be reviewed annually during the operation phase of the Project and potentially increased to meet the monitoring and mitigation needs associated with the Project. **There is a potential for additional monitoring and maintenance tasks to be required beyond the 30-year post-closure timeline that is currently not included in the reclamation cost estimate. Financial assurance for these tasks would be provided outside of the reclamation financial guarantee by means of a LTFM. The specifics of the LTFM and the amount of the assurance needed would be determined in cooperation with the BLM. The tasks to be covered by the LTFM could include, but are not limited to, the following: maintenance of pit perimeter fencing; water quality monitoring of the pit lake, management of the draindown from the PAG WRDF and management of the draindown from the TSFs; and maintenance of ET cells that would be constructed to manage long-term draindown from the TSF. Treatment of the pit lake water is not**

2.1.14.10 Growth Media/Cover Salvage and Storage

Suitable growth media and cover would be salvaged and stockpiled during the development of the mine pit, and during construction of the WRDFs and the TSFs. A **G**rowth **M**edia **M**anagement **P**lan **(GMMP)** is included in Appendix 10 of the Plan.

Following stripping, growth media and cover would be stockpiled within the proposed disturbance areas. Growth media/cover stockpile**s** would be located such that they would not be disturbed by mining operations. The surfaces of the stockpiles would be shaped after construction with overall slopes of 2.7H:1V or shallower to reduce erosion. To further minimize wind and water erosion, the soil stockpiles would be seeded after shaping with an interim seed mix developed in conjunction with the BLM. Diversion channels and/or berms would be constructed around the stockpiles as needed to prevent erosion from overland runoff. BMPs such as silt fences or staked weed free straw bales would be used as necessary to contain sediment liberated from direct precipitation.

2.1.14.11 Erosion and Sediment Control

BMPs would be used to limit erosion and reduce sediment in precipitation runoff from proposed Project facilities and disturbed areas during construction, operations, and initial stages of reclamation.

BMPs that would be used during construction and operation to minimize erosion and control sediment runoff and would include:

- **Surface stabilization measures – dust control, mulching, riprap, temporary gravel construction access, temporary and permanent revegetation/reclamation, and placing growth media;**
- **Runoff control and conveyance measures – hardened channels, runoff diversions; and**
- **Sediment traps and barriers – check dams, grade stabilization structures, sediment detention, sediment/silt fence and straw bale barriers, and sediment traps.**

Revegetation of disturbed areas would reduce the potential for wind and water erosion. Following construction activities, areas such as cut and fill embankments and growth media/cover stockpiles would be seeded as soon as practicable and safe. Concurrent reclamation would be maximized to the extent practicable to accelerate revegetation of disturbed areas. All sediment and erosion control measures would be inspected periodically, and repairs performed as needed.

2.1.15 Monitoring

As part of the Plan, EML proposes to monitor the following components in compliance with state permits and other plans: air quality, tailings effluent and solids chemistry, noxious weeds, reclamation, slope stability, storm water, waste rock chemistry, and wildlife (EML 2006).

EML has proposed a detailed Water Resources Monitoring Plan, which is incorporated in this EIS as Appendix **C. In addition to the monitoring requirements consistent with 43 CFR**

- Annual ground inspections of the transmission line with monthly inspections of the substation facilities.
- Routine maintenance to inspect and repair damaged structures, conductors, and insulators.
- Emergency maintenance to immediately repair transmission lines damaged by storms, floods, vandalism, or accidents. Emergency maintenance would involve prompt movement of crews to repair damage.
- Access road maintenance to re-grade and fill ruts or ground depressions, clear and repair culverts, and repair erosion-control features and gates.
- Vegetation management activities including clearing brush and noxious weeds, and undergrowth.
- Structure pad maintenance to re-grade and fill ruts and depressions around pole base and work areas.

Maintenance of the proposed transmission system would consist of monitoring, testing, and repair of equipment, as appropriate, based on a set maintenance program and schedule. EML would visually inspect each structure within the **ROW** at least annually. Some portions of access roads would be maintained, if necessary, to allow access of workers and equipment for maintenance. **The utility** would maintain the **ROW** in accordance with BLM **ROW** grant permit stipulations.

Maintenance would be performed as needed. When access is required for non-emergency maintenance and repairs, **the utility** would adhere to the same precautions taken during the construction. Emergency maintenance would involve prompt movement of crews to repair or replace any damage. Crews would be instructed to protect plants, wildlife, and other environmental resources. Restoration procedures following completion of repair work would be similar to those prescribed for normal construction. Noise, dust and danger caused by maintenance vehicle movement would be minimized to the extent practical.

To reduce the threat of wildland fire to the infrastructure associated with the powerline, EML would utilize one or more of the following mechanical treatments to keep vegetation at ten tons per acre of total aboveground biomass (or less) in areas that have piñon-juniper, two tons per acre of total aboveground biomass (or less) in big sagebrush (*Artemisia* sp.), and 800 pounds per acre of total above ground biomass (or less) of fine fuels in grasses: mowing/mastication; high intensity/short term grazing; hand thinning; or chemical treatment.

Activity fuels created by vegetation removal would be either piled and burned or chipped. Pile burning disposal would involve the burning of piles of specific size and fuel size distribution. The burning of the piles would be limited by the size of the pile, the time of day and season of ignition, live fuel moisture variations as a result of changes in elevation, and firing patterns.

Any surface disturbance would be reseeded with the BLM-recommended seed mixes. If noxious weed species are found, EML would contact the BLM Weeds Management Specialist in order to deal with the proper treatment and actions.

The assessment of the vegetation to determine the total above ground biomass EML would use the "Stereo Photo Series for Qualifying Natural Fuels Volume IV: Pinyon-Juniper, Chaparral, and Sagebrush Types in the Southwestern United States" to determine the values.

2.1.14.9 Wildland Fire Prevention

The following precautionary measures would be taken to prevent wildland fires. In the event Project-related activities result in a fire, EML would be held liable for all suppression costs.

a. Light vehicles traveling outside of the main mining areas and along roads that traverse vegetated rangeland during fire season would carry a small water supply in order to control sparks that may be generated by exhaust.

b. Adequate firefighting equipment i.e., shovel, pulaski, extinguisher(s), and a minimum of ten gallons of water would be kept at the drill site(s).

c. Vehicle catalytic converters would be inspected often and cleaned of all brush and grass debris.

d. When conducting welding operations, they would be conducted in an area free of or mostly free of vegetation. A minimum of ten gallons of water and a shovel would be on hand to extinguish any fires created from the sparks. Extra personnel would be at the welding site to watch for fires created by welding sparks.

e. Wildland fires would be reported immediately to the BLM Central Nevada Interagency Dispatch Center (CNIDC) at (775) 623-3444. Helpful information to be reported includes the location (latitude and longitude if possible), what is burning, the time the fire started, who/what is near the fire, and the direction of fire spread.

f. When conducting operations during the months of May through September, the operator must contact the BLM **Battle Mountain District Office (**BMDO**)**, Division of Fire and Aviation at (775) 635-4000 to find out about any fire restrictions in place for the area of operation and to advise this office of approximate beginning and ending dates for activities.

Additionally, the powerline ROW application includes the implementation of monitoring and maintenance as outlined in the POD (EML 2008a). The Maintenance Plan for the POD is summarized below.

> **EML would have an agreement in place with the utility to maintain the powerlines and associated equipment.** Emergency maintenance, such as repairing downed wires during storms and correcting unexpected outages, would be performed by **the contracted utility** or their subcontractor. **The utility** would respond to emergency conditions along the proposed route within a reasonable amount of time after an incident. The length of time needed to make the repairs would depend on the nature of the outage. **The agreement would mandate that** manuals include emergency response procedures, as well as operations and maintenance activities for substations, metering stations, and transmission lines which would be implemented for this Project as necessary.
>
> **The utility**, under an Operating and Maintenance Agreement with EML, would maintain the proposed transmission system by monitoring, testing, and repairing equipment. The following are typical maintenance activities:
>
> - Regular aerial or ground inspections with additional emergency aerial or ground inspections after storms, severe wind, lightning or other weather factors, or reported vandalism.

be added to fencing in greater sage-grouse habitat. Greater sage-grouse chick crossings would be installed along unburied portions of the water pipelines to allow non-flying chicks to cross the pipelines. These crossings would be constructed of earth and would be about 12 feet wide and have 3H:1V slopes.

2.1.14.7 Protection of Survey Monuments

To the extent practicable, EML would protect all survey monuments, witness corners, reference monuments, bearing trees, and line trees against unnecessary or undue destruction or damage. If, in the course of operations, any monuments, corners, or accessories would be destroyed, EML would immediately report the matter to the authorized officer. Prior to destruction or damage during surface disturbing activities, EML would contact the BLM to develop a plan for any necessary restoration or reestablishment activity of the affected monument in accordance with Nevada IM No. NV-2007-003 and the Nevada Revised Statutes (NRS). EML would bear the cost for the restoration or reestablishment activities including the fees for a Nevada Professional Land Surveyor.

2.1.14.8 Noxious Weeds, Invasive & Nonnative Species

A noxious weed monitoring and control plan would be implemented during construction and continue through operations. **The bulk of weed control in Eureka County on public and private land is accomplished through the Eureka County Department of Natural Resources and the Diamond Valley Weed Control District in coordination with the BLM on public land. A noxious weed monitoring and control plan would be implemented during construction and continuing through operations. EML would coordinate weed control with Eureka County and the Diamond Valley Weed Control District.** The Plan would contain a risk assessment, management strategies, provisions for annual monitoring, treatment, and treatment evaluation. The results from annual monitoring would be the basis for updating the plan and developing annual treatment programs.

The Noxious Weed Plan is included in Appendix 13 of the Plan and includes the following objectives: 1) to provide the steps necessary for EML to assess the existence of noxious weeds within and adjacent to the Project boundary; 2) to provide EML with preventive and treatment measures which would control the spread and establishment of noxious weeds; 3) to formulate management objectives consistent with the BLM; 4) to set priorities for weed management; and 5) to identify monitoring needs and frequency of monitoring (EML 2006).

The Project would have areas of disturbance, including those associated with ROWs, roads and travel corridors, where management for the prevention of invasion by noxious weeds and nonnative plant species and infestation of rodents would be implemented. Nevada certified licensed applicators would be contracted, as necessary, to apply any chemical pesticides determined to be required to control invasive pests in accordance with federal and state laws and regulations. This would include both restricted-use and general-use pesticides as regulated by Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and NRS Chapter 555. All pesticides and herbicides would be used in accordance with their individual labeling which contains the requirements and procedures for transportation, use, storage, and disposal.

the segregated material. The WPCP and engineering design documents provide additional detail on methods to segregate, manage, and monitor waste rock (EML 2009a).

EML has prepared a storm water management plan (EML 2006, Appendix 7). This plan identifies additional specific control measures and monitoring requirements. The actual locations and numbers of sediment controls would be determined during final design and where appropriate during operations. In either case, the controls would be developed in accordance with the storm water plan and engineering design documents included in the WPCP.

A survey to identify waters of the US was conducted **in 2007** and no waters of the US were identified in the Project Area. **EML and the U.S. Army Corps of Engineers (USACE) are working together to update the survey and determination.**

2.1.14.5 Technical Updates

During the course of operations, EML along with stakeholders would periodically review and update, as necessary, the geochemical and hydrogeological predictions, mine waste characterization studies, and pit lake studies to incorporate new information accumulated during operations. **EML, along with stakeholders, would review the data every five years and make updates as necessary.** These updates would be provided to all stakeholders and would provide quantitative predictions of water quality during the operational and post-closure period. **For the purpose of this section, stakeholders are defined as agencies with regulatory authority and parties with an interest in technical evaluation of the proposed operations. EML recognizes that this could potentially encompass a large number of parties, and is committed to making ongoing evaluations available for public review within the constraints of efficient completion of such updates.**

2.1.14.6 Wildlife including Migratory Birds

Land clearing and surface disturbance would be timed to prevent destruction of active bird nests or young of birds during the avian breeding season (as determined by the MLFO) to comply with the Migratory Bird Treaty Act (MBTA) (see Mitigation Measure 3.23.3.3-7 for the timing). If surface disturbing activities would be unavoidable during the avian breeding and nesting season, EML would have a qualified biologist survey areas proposed for disturbance for the presence of active nests immediately prior to the disturbance. If active nests were located, or if other evidence of nesting is observed (mating pairs, territorial defense, carrying nesting material, transporting of food), an appropriate buffer would be identified by BLM and NDOW biologists and be placed around the nest to prevent destruction or disturbance of nests until the birds would be no longer present.

Operators would be trained to monitor the mining and process areas for the presence of larger wildlife such as mule deer (*Odocoileus hemionus)* and sensitive species such as greater sage-grouse. Mortality information would be collected and reported in accordance with the industrial artificial pond permit. EML would establish wildlife protection policies that would prohibit feeding or harassment of wildlife.

Power poles would be built with **perch deterrents** to protect raptors from electrocution and to reduce predation of greater sage-grouse by perching raptors. Flagging or flight diverters would

Fugitive Dust Control Plan. In general, the Fugitive Dust Control Plan would provide for water application of haul roads and other disturbed areas, chemical dust suppressant application (such as magnesium chloride) where appropriate, and other dust control measures as per accepted and reasonable industry practices. Where appropriate, disturbed areas would be seeded with an interim seed mix to minimize fugitive dust emissions from unvegetated surfaces.

Dust emissions in the process area would be controlled at the crusher and conveyor drop points through the use of water sprays and dry cartridge filter type dust collectors where necessary. Other process areas requiring dust or emission controls include the concentrate drying and packaging circuit, the TMO plant, FeMo plant, and the laboratory. Appropriate emission control equipment would be installed and operated in accordance with the construction and operating air permits.

2.1.14.3 Cultural Resources

Class III cultural resources surveys have been performed over the Project Area. A historic and ethnohistoric context document has been prepared. Avoidance is the BLM preferred treatment for preventing effects to historic properties (a historic property is any prehistoric or historic site) eligible to the NRHP or unevaluated cultural resources. However, if avoidance is not possible or is not adequate to prevent adverse effects, EML would undertake data recovery at the affected historic properties in accordance with the Programmatic Agreement (PA) between BLM, Nevada State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservation that is presently in progress. Development of a treatment plan, data recovery, archeological documentation, and report preparation would be based on the "Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation," 48 CFR 44716 (September 29, 1983), as amended or replaced. If an unevaluated site cannot be avoided, additional information would be gathered and the site would be evaluated. If the site does not meet eligibility criteria as defined by the Nevada SHPO, no further cultural work would be performed. If the site meets eligibility criteria, a data recovery plan or appropriate mitigation would be completed under the PA.

EML would provide training to employees and contractors regarding the importance of cultural resources protection. EML would establish operational policies to protect cultural resources and minimize the potential for inadvertent impacts to sites.

The tailings and reclaim lines would cross the Pony Express Historic Trail as shown on Figures 2.1.1, 2.1.3, and 2.1.5 and would be buried as described in Section 2.1.7.1. EML would minimize impacts to the Pony Express Historic Trail by maintaining 450-foot buffers on either side of the trail for other facilities.

2.1.14.4 Waters of the State and Waters of the United States

Process components would be designed, constructed and operated in accordance with NDEP regulations. The proposed process facilities would be zero discharge and the TSFs would have engineered liner systems. Waste rock with the potential to generate acid or mobilize deleterious constituents would be identified through laboratory analyses during mining and segregated in the WRDFs designed to contain and collect precipitation and snowmelt that comes into contact with site and the duration of the mine life, EML plans to provide buses to transport employees residing in Elko, Carlin, Eureka, and other points in the region to and from the mine. Bus round trip transportation from Elko would average four trips per day and peak at five trips per day. Bus round trip transportation from Eureka would average two trips per day and peak at three trips per day.

2.1.14 Applicant Committed Practices

EML would commit to the following practices, to prevent undue or unnecessary degradation during the life of the Project. These practices, described briefly below, would be considered part of the operating procedures.

2.1.14.1 Socioeconomic Practices

EML proposes to meet with Eureka County on a regular basis to provide Project updates. These updates would be intended to provide information related to employment numbers, housing plans, transportation plans and other aspects of the Project that would allow Eureka County to more effectively prepare for changes to the community and the potential for increased demands on county-provided services. In addition, EML would provide updates on taxes paid to state and local governments to allow a clear assessment of the impact on county services, in comparison to the revenues made available to deliver those services. EML would work with County staff to quantify potential gaps in revenue versus cost for services, should they occur. Further, EML would work with Eureka County to find ways to remedy any imbalance, such as providing necessary services at less cost, including contribution of EML resources.

In addition, EML proposes to work with Eureka County to identify ways to improve medical services and emergency response services for the community. EML would encourage employees to become active members of the volunteer fire and medical emergency response services.

In an effort to reduce traffic on existing roads, EML would provide bus or other multi-passenger transportation to employees. EML would also encourage carpooling among employees that do not elect to use company-provided transportation. EML would discourage unnecessary visits to the Project area by vendors, contractors, and mine support services. EML would coordinate with Eureka County and NDOT to address any transportation issues.

In addition, should there be sufficient interest, EML would establish and participate in a Mine Oversight and Liaison Yardstick Committee. This committee would be responsible for continually measuring effectiveness of these practices and identifying issues of concern to the local community.

2.1.14.2 Air Emissions

Appropriate air quality permits would be obtained from the NDEP, Bureau of Air Pollution Control (BAPC) for the new Project facilities and land disturbance. Committed air quality practices would include dust control for mine unit operations as described by the BAPC required

2.1.12 Exploration

Exploration activities would continue within the Project boundary in order to identify new reserves or expand existing reserves. Activities would consist of drill road and pad construction, surface sampling, trenching, bulk sampling, and drilling using both reverse circulation and core rigs. Exploration activities may also include water exploration and monitor well installation.

Exact locations of the exploration disturbance have not been determined. However, it is anticipated that up to 50 acres of temporary surface disturbance could be created for exploration activities outside of the identified areas of surface disturbance within the Project Area. This exploration work within the Project boundary would occur after the BLM reviews and concurs with EML's phased exploration work submittal that identifies the specific surface disturbance to ensure that all identified sensitive resources are managed in accordance with the Plan approval. The roads and pads would be sited to avoid identified cultural resources and the Pony Express Historic Trail **in accordance with the approved treatment plan.**

2.1.13 Work Force

Construction would be performed by contractors over an approximately 18- **to 24-**month period with an estimated 400 personnel on average and an estimated peak of 615 personnel. During this same time, pre-stripping would be performed to remove overburden within the area of the initial pushback of the open pit. The operations workforce would include mine equipment operators, mill operators, mining and mill maintenance mechanics, administrative personnel, technical professionals (metallurgists, engineers, geologists, etc.) security staff, and other miscellaneous employees. **Employment for the Project would average about 370, and reach a maximum of about 455**. Table 2.1-6 presents the projected average labor requirements.

Table 2.1-6: Average Project Labor Personnel Requirements[1]

Category		Start of Construction	Beginning of Mining	Full Operations
Administration	Salary	9	9	12
	Hourly	10	14	20
Mine Operations	Salary	19	23	23
	Hourly	0	47	126
Mine Maintenance	Salary	2	12	12
	Hourly	21	115	66
Process Operations	Salary	2	2	9
	Hourly	2	7	74
Total Vacation, Sickness, Absence Allowance		1	9	28
Total		**66**	**238**	**370**

[1] These numbers are estimates of the number of individuals, and actual numbers may vary.

The mine and processing plants would be scheduled to work 365 days per year. In general, the operations would occur over two shifts per day, 12 hours per shift; however this schedule may vary for select crews depending on their work assignments. Due to the remoteness of the mine hydrochloric acid, hydrofluoric acid, and sodium hydroxide. Small quantities of other reagents may be used periodically. Lab sinks would be designated either as an "acid" sink or a "base" sink. These sinks would drain to tanks within containment. The tank contents would be neutralized on a regular basis. The neutralized waste would be disposed in accordance with applicable regulatory requirements.

2.1.11.3 Waste Disposal Management

Used lubricants and solvents would be characterized according to the Resource Conservation and Recovery Act (RCRA) requirements and would be stored appropriately. EML has obtained a Hazardous Waste Identification Number from the Environmental Protection Agency (EPA). The mine is expected to be in the "conditionally exempt small quantity generator" category as defined by the EPA. Used solvents are the only identified potential hazardous wastes at this time. EML would institute a waste management plan that would identify the wastes generated at the site and their appropriate means of disposal.

Used oil and coolant would also be stored at the maintenance building and truck shop in secondary containment. The materials would be either recycled or disposed of in accordance with state and federal regulations. Used containers would be disposed of or recycled according to federal, state, and local regulations.

Solid waste generated by the mine and process departments would be collected in dumpsters near the point of generation. Industrial solid waste would be disposed of in an on-site Class III landfill in accordance with NAC 444.731 through 444.737. A training program would be implemented to inform employees of their responsibilities in proper waste disposal procedures.

The Class III landfill would be located near the edge of the southern portion of the Non-PAG WRDF, as shown on Figures 2.1.1 and 2.1.3. A trench would be excavated parallel to and at a safe distance from the face of the advancing toe of the WRDF. The advancing WRDF would eventually cover the trench, which would be replaced by other trenches in sequence. When the waste rock storage lift has reached its extent, trenches would be excavated in the subsequent lifts.

EML would have a trained response team at the site 24 hours per day to manage potential spills of regulated materials at the site. Response for transportation-related releases of regulated materials bound for the site would be the responsibility of the local and regional agencies. However, where appropriate, EML may assist with response to off-site incidents, including providing resources, based on agency requests.

2.1.11.4 Explosives Handling

Explosive agents would be purchased, transported, stored, and used in accordance with the Department of Homeland Security; Bureau of Alcohol, Tobacco, and Firearms provisions; and MSHA regulations. The primary explosive used would be ANFO. Ammonium nitrate prill would be stored in a silo, while explosive agents, boosters, and blasting caps would all be stored within secured areas.

Reagent	Storage	Amount/ Delivery	Trucks/ Month	Approximate Consumption per Day
Flocculent distribution tanks	Two 25,000-gallon tanks	-	-	135,000 gallons
Iron oxide	60-ton dispensing bin	20 tons	6	3.9 tons
FerroSilicon (50 percent)	60-ton dispensing bin	20 tons	12	7.7 tons
Aluminum	30-ton dispensing bin	20 tons	1	0.7 tons
CaAlumina	30-ton dispensing bin	20 tons	0.5	0.3 tons

[1] No deliveries associated with these tanks. They are mix and distribution tanks only.

A portable fuel storage and dispensing system may be used in the pit at the later stages of pit life to shorten the distance mine equipment would have to travel to fuel. This system would contain diesel fuel and gasoline tanks in secondary containment and a diesel powered generator to power the dispensing units. The system would be emptied and moved periodically by trailer as needed.

Lubricants and antifreeze would be managed and stored in the area as required by the MSHA and other state and federal regulations. Lesser quantities of solvents, paints, and other materials would be stored at the truck shop and managed in the same manner.

2.1.11.2 Reagents and Chemicals

Most reagent tanks would be located outside of the mill building in secondary containment as shown on Figure 2.1.8. Mix and distribution tanks for the sodium metasilicate, Witconate 90, and the flocculant would be located indoors near the mill in secondary containment. Other reagents include sodium carbonate, sodium hydroxide, ammonia, flocculants, and antiscalant.

Secondary containment would be sized to contain 110 percent of the volume of the largest tank or tanks in series. Spills would be handled according to state and federal regulations. Spills would report to a sump, the contents of which could be pumped back into a tank or into the process. Outdoor tanks and lines would be insulated and heat traced as necessary to protect against temperature changes. Ferric chloride, ammonium hydroxide, and hydrochloric acid would be stored adjacent to the ferric chloride leach facility in secondary containment with the capacity to contain 110 percent of the largest tank. The ammonium hydroxide would be stored in an area separate from the ferric chloride and hydrochloric acid. The floors would be concrete and covered with a sealant to prevent discharge to the environment. Spills would report to separate sumps, the contents of which could be pumped back into the tanks or returned to the process. Spills would be handled according to state and federal regulations. Table 2.1-5 presents the reagents that would be used, the volumes that would be stored on site, and the number of shipments anticipated per month. These estimates may vary depending on the metallurgical conditions encountered during operations. EML may elect to substitute reagents with similar chemical compositions for those listed if greater flotation recovery or more efficient gas scrubbing can be realized.

Reagents used in the analytical and metallurgical test procedures would be stored at the laboratory and generally include small quantities of nitric acid, sulfuric acid **(H_2SO_4)**,

Reagent	Storage	Amount/ Delivery	Trucks/ Month	Approximate Consumption per Day
Hydraulic Fluid (synthetic)	5,000-gallon tank	1,000 gallons	1	30 gallons
Gear Oil	5,000-gallon tank	1,000 gallons	1	30 gallons
Antifreeze	5,000-gallon tank	1,000 gallons	1	30 gallons
Used Oil	7,500-gallon tank	1,000 gallons	1-	30 gallons
Used Antifreeze	7,500-gallon tank	6,000 gallons	1	125 gallons
Propane	Three 30,000-gallon tanks	10,000 gallons	11	3,600 gallons
Ammonium nitrate	Three 70-ton silos	38 tons	41	52 tons
Ammonium Hydroxide	24,000 gallons	2,800 gallons	6	1,000 gallons
Quicklime-Mill/Leach	Two 500-ton silo	22 tons	205	150 tons
Milk of Lime Mixing Tanks	Two 30,000-gallon tanks	-[1]	-	160,000 gallons
Diesel Fuel - Flotation	Two 25,000-gallon tank	6,600 gallons	17	3,600 gallons
Methyl Isobutyl Carbinol (MIBC)	20,000-gallon tank	6,600 gallons	2.5	540 gallons
Fuel Oil No. 2 / MIBC Blend	20,000-gallon tank	-	-	490 gallons
Ferric Chloride at 40 percent weight	Two 25,000-gallon tank	3,500 gallons	51	6,000 gallons
Hydrochloric Acid at 35-40 percent weight	10,000-gallon tank	3,000 gallons	2	165 gallons
Pine Oil	25,000-gallon tank	6,150 gallons	4.5	900 gallons
Flomin D-910 (depressant)	20,000-gallon tank	22 tons per truck	1	750 pounds
Sodium Meta-Silicate	75-ton dry bulk silo	22 tons	11	7.5 tons
Sodium Meta-Silicate Mix Tank	25,000-gallon tank	-	-	5,000 gallons
Sodium Meta Silicate Distribution Tank	25,000-gallon tank	-	-	5,000 gallons
Witconate 90	200-pound fiber drums	96 drums per truck	2	1,250 pounds
Witconate 90 distribution tank	3,000-gallon tank	-	-	5,000 gallons
Antiscalant	7,000-gallon tank	5,000 gallons	1	120 gallons
Flocculent	1,650-pound supersacks	24 supersacks per truck	2	1,800 pounds
Flocculent mix tank	15,000-gallon tank	-	-	135,000 gallons

County Emergency Medical Services (EMS) may be contacted for assistance with medical response or transportation.

Emergency response vehicles and a trained mine rescue team would respond to fire and medical emergencies at the site. An ambulance would be located at the safety/security building to respond to on-site emergencies. A separate radio frequency or emergency protocols would be put in place for use. A helipad located near the safety/security building would be available for use by emergency aircraft. EML **intends to have agreements with the Eureka County Fire and Ambulance Service regarding mutual assistance, and has initiated discussions with this entity regarding emergency response cooperation.** EML anticipates that local and regional agencies would maintain sole responsibility for response to incidents outside of the Project boundary. Mine rescue and fire response teams may be available to assist with off-site response if requested by agency personnel or others.

2.1.11 Chemical Use and Management

2.1.11.1 Fuels, Lubricants, and Reagent Storage

A satellite fuel storage depot would be located at the truck shop. This fuel depot would include gasoline and diesel above ground tanks for fueling of small and intermediate vehicles. Secondary containment would be designed to hold 110 percent of the volume of the largest tank. Fuel would be delivered via tanker truck. Drivers off-loading fuel would be certified and trained. Appropriate hose fittings would be located within the containment to collect spilled fuels. A sump would be located at one end of the containment so spilled fuels could be pumped from the containment using a portable pump.

Other lesser quantities of hydrocarbons and regulated materials would be located at the truck shop, warehouse, and mill area. These would be kept indoors in proper storage and secondary containment systems. Table 2.1-5 shows the fuels and reagents that would be used, approximate quantities to be stored, average usage rates, and the numbers of monthly shipments. The total monthly truck trips to deliver chemicals to the Project would be approximately 574, or approximately 19 per day.

Table 2.1-5: Monthly Shipments of Reagents, Volumes, and Shipments

Reagent	Storage	Amount/ Delivery	Trucks/ Month	Approximate Consumption per Day
Diesel Fuel (for off road use)	Three 100,000-gallon tank	6,600 gallons	185	40,000 gallons
Gasoline	10,000-gallon tank	6,600 gallons	2	400 gallons
Highway Diesel	10,000-gallon tank	6,600 gallons	2	400 gallons
Automatic Transmission Fluid	5,000-gallon tank	1,000 gallons	1	30 gallons
Engine Oil	5,000-gallon tank	2,000 gallons	2	125 gallons
Engine Oil Spare	5,000-gallon tank	2,000 gallons	2	125 gallons

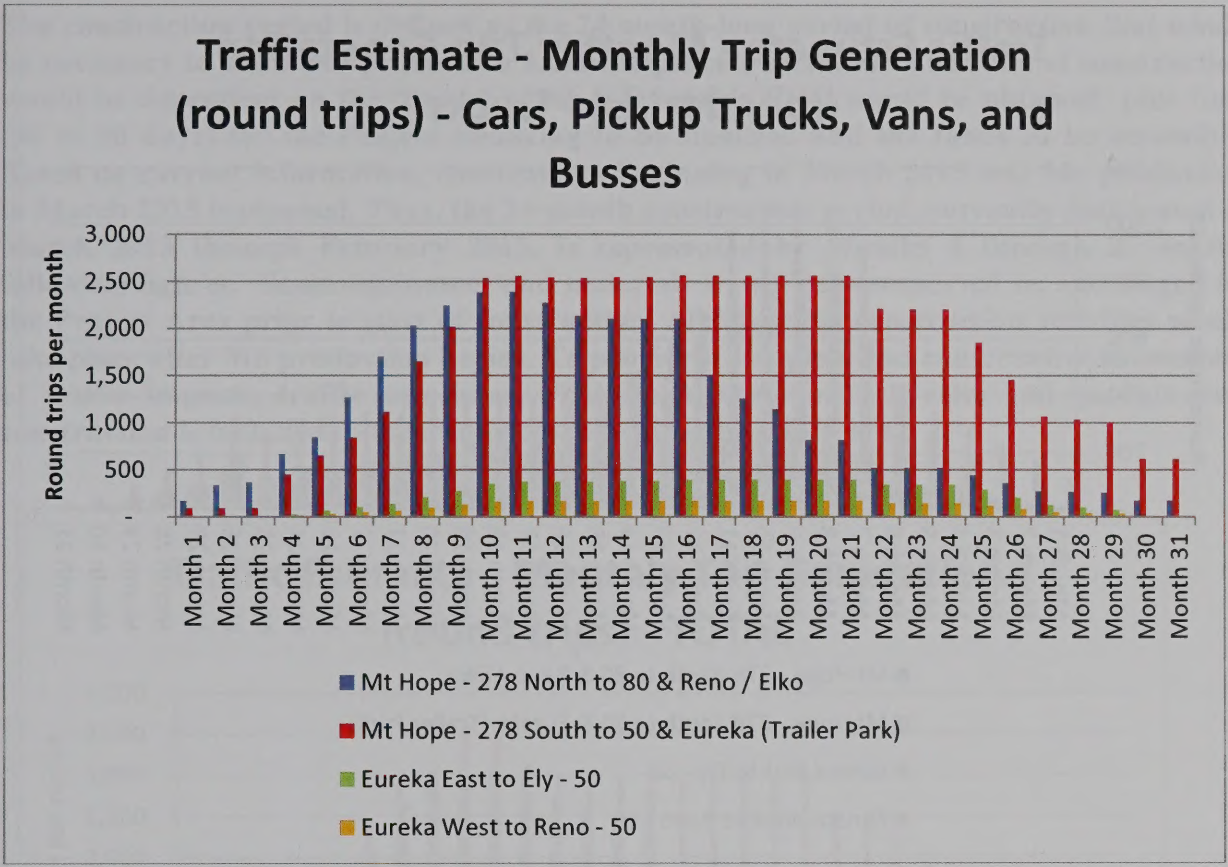


Figure 2.1.20: Estimated Car, Pickup Truck, Van, and Bus Project-Related Construction Traffic

2.1.10 Safety and Fire Protection

The Project would operate in conformance with all MSHA safety regulations (30 CFR 1-199). Site access would be restricted to employees and authorized visitors. Fire protection equipment and a fire protection plan would be established for the Project Area in accordance with State Fire Marshal standards.

A separate fire suppression water system would be installed to provide service to the buildings. Fire hydrants would be placed at regular intervals around the buildings. The buildings would have sprinkler systems and hand held fire extinguishers available in accordance with MSHA regulations and industry standards. A fire truck would be located on site for use in structure and equipment fires. Employees would be trained in the use of hand held fire extinguishers and alarm systems.

EML or its contractor would have emergency medical personnel on site during construction. EML would have emergency medical personnel on site during operations and would maintain a licensed ambulance with licensed driver for transportation in the event of an incident that required this level of attended emergency transportation. However, should a medical emergency occur, it is recognized that, depending on the specifics, Eureka

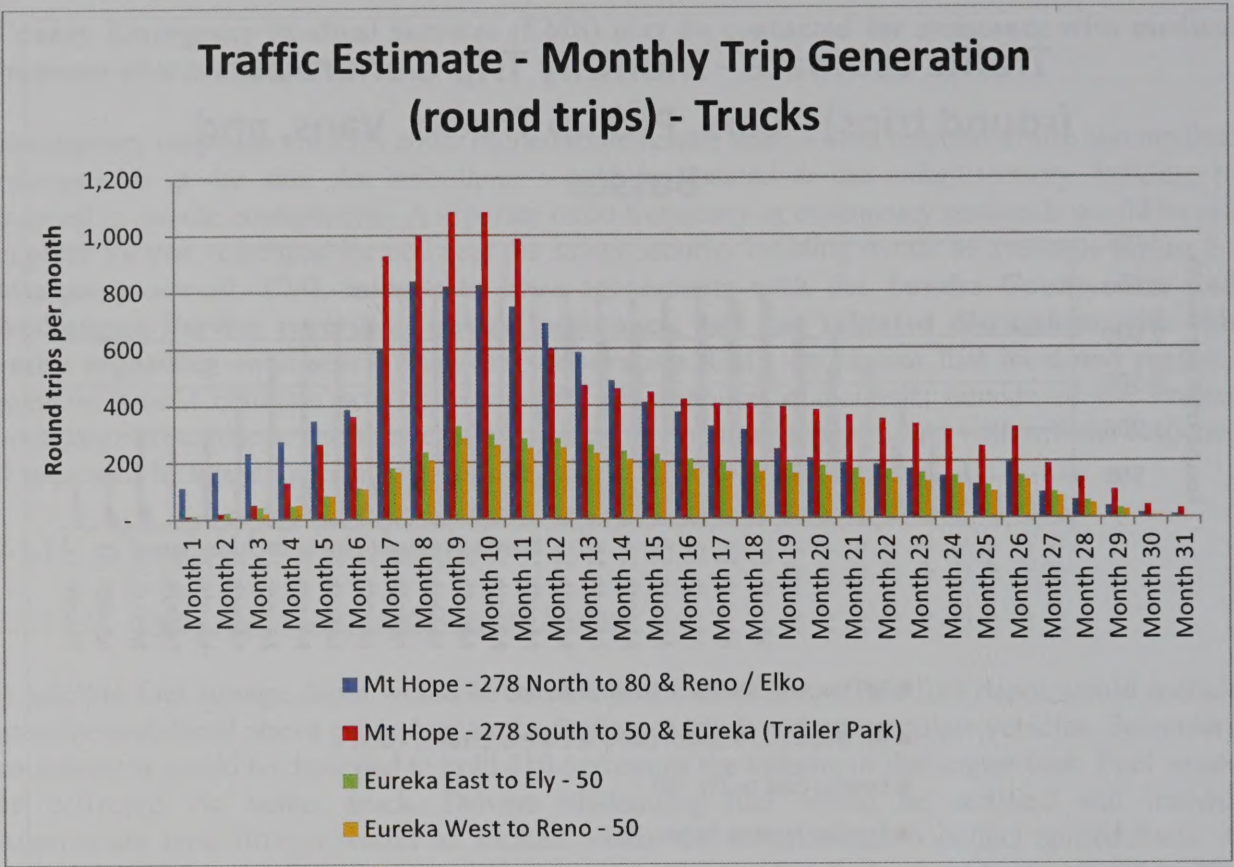


Figure 2.1.19: Estimated Truck Project-Related Construction Traffic

The majority of truck traffic would originate from the north, while the majority of traffic originating from the south would be associated with commuting construction labor (busses, vans, pickup trucks, and autos). A significant portion of truck traffic identified as originating in Eureka consists of aggregate that would be hauled from Diamond Valley, and these trucks would not actually travel through the town of Eureka. Trips originating at points east of the U.S. Highway 50 – SR 278 intersection would travel through the town of Eureka.

Estimated peak traffic counts are projected to occur in Month 10 of construction, currently expected to be September 2013. During this month, the estimated traffic would include approximately 3,600 round-trips (trucks and commuting labor) from Eureka (and Diamond Valley), approximately 3,200 round-trips from the I-80 corridor, approximately 650 round-trips from the east on U.S. Highway 50 and approximately 400 round-trips from the west on U.S. Highway 50.

For the Project-related operational transportation there would likely be truck, car, pickup truck, van, and bus traffic. The truck traffic would result in approximately 26 daily truck trips, including the toll roasting. In addition, there would be an undetermined increase in passenger (car, pickup, van, and bus) vehicle trips per day on SR 278. Some Project-related traffic would utilize U.S. Highway 50.

The construction period is defined as the 24 month-long period of construction that would be necessary to allow Mo production from the process facilities. The start of construction would be dependent on the time at which a favorable ROD would be obtained, plus time (30 to 90 days) for the Project financing to be finalized and the funds to be accessible. Based on current information, construction beginning in March 2013 and Mo production in March 2015 is planned. Thus, the 24-month construction period, currently anticipated at March 2013 through February 2015, is represented by Months 4 through 27 on the following figures. Some equipment and materials would be transported to, and staged at, the Project Area prior to start of construction. Additionally, construction activities would take place after Mo production begins. To provide a complete and conservative assessment of traffic impacts, traffic associated with pre-construction deliveries and post-start-up construction is included in the estimate and depicted in the figures.

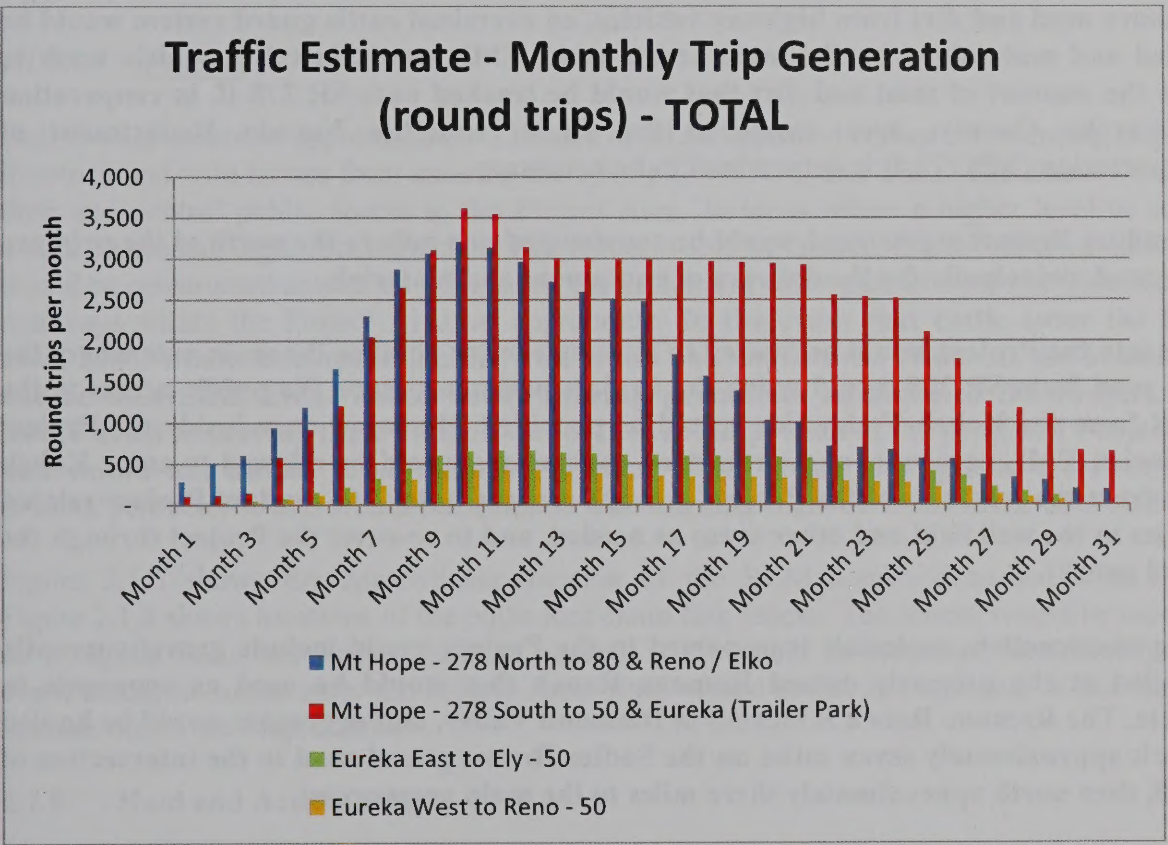


Figure 2.1.18: Estimated Total Project-Related Construction Traffic

Round trips are segregated on the basis of the likely point of origin. Traffic that would originate from points south of the Project is segregated into trips that would originate at points west of the U.S. Highway 50 - SR 278 intersection, trips that would originate at points east of the U.S. Highway 50 - SR 278 intersection, and trips that would originate in Eureka or Diamond Valley (traffic identified in the graphs as originating in the town of Eureka includes traffic that would originate in Diamond Valley).

2.1.9 Access and Transportation

A primary access road about 32 feet wide (24 feet running surface width plus four-foot wide shoulders) would be constructed to connect the proposed Project Area with SR 278. Following Project construction, EML may pave this primary access road.

To enhance safety, turn and acceleration lanes would be constructed within the existing ROW for SR 278 at the Project entrance. A deceleration/right turn lane would be constructed for southbound traffic beginning north of the Project turnoff and would be extended south of the turnoff to provide an acceleration lane for the southbound traffic. A deceleration/left turn lane would be constructed for northbound traffic beginning south of the Project turnoff, and an acceleration lane would be constructed beginning at the Project turnoff and extending north.

To remove mud and dirt from highway vehicles, an oversized cattle guard system would be installed and maintained on the main access road. EML would install a vehicle wash to reduce the amount of mud and dirt that would be tracked onto SR 278 if, in cooperation with Eureka County, area residents, the BLM, and the Nevada Department of Transportation (NDOT), it is determined to be necessary.

A secondary Project access road would be constructed one mile to the north of the primary access road, principally for the delivery of equipment and materials.

Access into the Project would be limited to the single entry point at the main gate where the access road from SR 278 would reach the Project perimeter fence. No public access to the Project from the Kobeh Valley side would be provided. However, once inside the Project boundaries, EML personnel and authorized contractors would be allowed to enter Kobeh Valley from the west side of the Project through secured gate(s) to conduct Project-related activities in the well field and other areas as needed, and to re-enter the Project through the secured gate(s).

During construction, materials transported to the Project would include gravel currently stockpiled at the privately owned Romano Ranch that would be used as aggregate in concrete. The Romano Ranch is located in Diamond Valley, and aggregate would be hauled by truck approximately seven miles on the Sadler Brown gravel road to the intersection of SR 278, then north approximately three miles to the main access road.

Transportation activities associated with the Project would include construction of facilities that would result in associated traffic. The amount of traffic has been estimated based on the amount of equipment and materials that would be delivered to the site and the number of construction employees that would travel to the site. The estimated traffic, on a monthly, round-trip basis, is outlined below and presented in Figures 2.1.18, 2.1.19, and 2.1.20. Figure 2.1.18 shows the total estimated traffic associated with the Project construction. Figure 2.1.19 shows the estimated truck traffic associated with the Project construction. Figure 2.1.20 shows the estimated car, pickup truck, van, and bus traffic associated with the Project construction.

2.1.7.5 Borrow Areas

Borrow areas would be located within the facility footprints. Borrow sources would be required for prepared subgrade materials, drainage materials, pipe bedding materials, road surfacing materials, retarding layer materials, closure cap materials, growth materials and riprap. If these areas would be unable to provide sufficient quantities of borrow material, other sites outside of the facility footprints would be identified and tested to determine the material properties and amount available, which would require a revision of the Plan and be subjected to additional environmental analysis. Depth of potential borrows would be expected to be between five and **twenty-five** feet. In cases where a borrow source would be constructed outside of a planned facility, the borrow area would be graded to drain. Borrow areas may be revisited over the mine life. Areas outside of the facility footprints that would be dormant for over 12 months would be seeded with an interim seed mix to control dust and erosion and to prevent the encroachment of invasive, nonnative species.

2.1.7.6 Fencing

EML would construct approximately 22 miles of BLM approved barbed wire fencing to prevent livestock and wild horses from entering the open pit, WRDFs, and TSFs. This fence would also limit and control public access to the Project Area. In areas where a higher level of security would be needed, eight-foot high chain link fences would be erected. Eight-foot chain link fences would be constructed around all collection ponds. Gates or cattle guards would be installed along roadways within the Project Area, as appropriate. **In the event that cattle enter the fenced area, EML would attempt to identify the brand and contact the owner. If the brand could not be identified, EML would notify grazing permittees adjacent to the Project. EML would assist in moving these animals out of the fenced portion of the proposed Project Area and would not harass these animals.** In areas where greater sage-grouse are likely to be present, perimeter fences would be equipped with flagging/flight diverters to increase visibility.

Figure 2.1.5 shows the approximate location of the BLM approved barbed wire fencing. Figure 2.1.8 shows locations of the eight-foot chain link fences. The fences would be monitored on a regular basis and repairs made as needed. BLM would be contacted immediately in the event that wild horses enter the Project Area. EML would assist, as requested, in moving these animals out of the Project Area.

2.1.8 Haul and Access Roads

Haul roads would be nominally constructed with an average 120-foot wide running width and a maximum gradient of approximately ten percent. The roads would be constructed according to MSHA standards, which include a berm at least the height of half the wheel height of the largest vehicle utilizing the road. Runoff from haul and access roads would be collected and routed to sediment retention ponds as necessary.

Secondary roads would generally be approximately 20 feet in width. These roads would also be bermed in accordance with MSHA regulations. BMPs would be used where necessary to control erosion.

The permanent diversion and collection structures would be sized for the 100-year, 24-hour storm event with additional capacity to allow less frequent maintenance and would have the capacity to safely pass the inflow design flood peak flow during operations and at closure.

Diversion channels associated with the WRDFs would be constructed to collect and divert non-impacted waters. Collection channels would be constructed to collect and contain potentially impacted water from within the facility footprints.

Permanent collection channels (Collection Channels No. 1 and No. 2) associated with the PAG WRDF would direct runoff to geomembrane lined ponds (Phase 1 and Phase 2), respectively located at the southern portion of the LGO Stockpile. The collection channel foundation surfaces would be prepared and lined with geomembrane. Other diversion channels would divert storm water that has not contacted mining components from the natural ground away from the PAG WRDF and the LGO Stockpile area. These diversion channels would be lined with geomembrane and riprap, and would be removed with the construction of the stockpiles beyond Year 5. All of the channels would be designed to carry estimated peak flows associated with the 100-year, 24-hour storm event.

Diversion and collection channels associated with the Non-PAG WRDF would be designed in stages around the footprint of the WRDF. They would be designed to convey the peak flow associated with the 100-year, 24-hour storm event. Most of the channels would be lined with a 60-mil HDPE geomembrane with outlet segments lined with riprap.

Riprap dams for the WRDFs would be associated with the PAG WRDF permanent collection channel and would be designed to block a portion of the channel so that sediments would be stored behind them in a basin. The sediment basins would be approximately **twenty** feet by ten feet and the dams would be approximately four feet high.

Sediment control structures would be located at the toe of each Non-PAG WRDF in drainages located at the outfall of the Non-PAG WRDF temporary diversion channels. They would be comprised of a rock berm placed across the drainage. The structures would be sized to contain the runoff volume generated from a 25-year, 24-hour storm event. Sediment control structures would be added or moved in stages with the growth of the WRDF.

Surface water diversion channels associated with the TSF would be constructed to direct surface water away from the tailings impoundments through channels and culverts. The channels would be both temporary and permanent. Permanent channels would remain throughout the life of the facility, and temporary channels would be removed with the construction of the phased expansions to the impoundment basin. At the time of construction of the TSFs' starter embankments, permanent diversions would be constructed at the limits of the planned ultimate footprint. This channel would intercept surface water from the catchment area located above the proposed TSF site. Temporary diversion channels would be placed within the ultimate tailings basin footprint to limit the runoff reporting to the tailings impoundment from the watershed that is between the permanent diversion channels and the active tailings area.

Sediment control structures associated with the TSF would be placed at several locations in drainages downstream of the TSF. The placement of sediment control structures for the North TSF would be determined closer to the date of construction.

Administration offices would be located near the security building as shown on Figure 2.1.8. These offices would house the reception area, offices for administrative staff, and meeting rooms.

The safety/security building would be located on the main access road approximately 300 yards from the administration building as shown on Figure 2.1.8. A gatehouse manned by security guards would be located next to the safety/security building. The safety/security building would include a first aid clinic and a meeting/training room. An ambulance and fire truck, staffed and operated by mine personnel, would be stationed at the safety/security building to respond to accidents and incidents. A helipad would be located nearby in the event a medical air evacuation is needed.

Septic systems and leach fields would be installed at the mill, truck shop, administration building, laboratory, and mill maintenance buildings for sewage. The biosolids would be pumped as necessary by a licensed septic waste hauler and transported to a licensed repository.

In the process, maintenance, warehouse, laboratory and administration areas, lighting would have screens to prevent the bulb from shining up or out, and would be located to avoid light shining onto adjacent lands as viewed from a distance. Within these areas lighting fixtures would be hooded and shielded, face downward, be located within soffits and directed on to the pertinent site only, and away from adjacent parcels or areas. Buildings would be painted in earth tones so they are compatible with the natural environment.

2.1.7.3.2 Petroleum Contaminated Soils

EML would submit a Petroleum Contaminated Soil Management Plan to the Nevada BMRR and BLM, describing how petroleum contaminated soils would be treated or disposed of at the mine. EML may also elect to ship petroleum contaminated soils off site to an approved disposal facility.

2.1.7.4 Sediment Control

Sediment would be controlled using best management practices (BMPs) during construction and operation. Management practices may include, but would not be limited to, diversion and routing of surface storm water using accepted engineering practices, such as diversion structures, sediment collection ponds, and rock and gravel covers.

Surface storm water from the plant yards would be directed through permanent collection channels to one of two collection ponds with capacities of approximately 6.5 million gallons and 500 thousand gallons. The collection ponds would be monitored in accordance with the Fluid Management and Monitoring Plan included in the Water Pollution Control Permit (WPCP) application (EML 2009a). Sediment removed from the collection ponds would be **used as fill or growth media, or placed in the WRDF** or in the TSF.

Storm water that has not contacted mining components would be diverted around the process area through permanent diversion structures.

The existing Falcon-Gondor powerline would be rerouted as a result of constructing the North TSF, which would not occur until more than 30 years into mine operations. The powerline location could vary based on detailed engineering.

The fresh water wells would require a separate 24.9-kV line stepped down to a voltage compatible with the pump system. This powerline would originate at the mill substation and follow the routes shown on Figure 2.1.7. **Within the greater sage-grouse lek two-mile buffer areas, the powerline would be constructed below ground. To further protect greater sage-grouse, the wellfield powerline may also be buried in areas outside of the two-mile buffer around active leks. However, as currently designed, the powerline outside of these areas would be constructed above ground. Above-ground powerlines would be equipped with perch deterrents.**

Two backup diesel generators, each capable of producing 1,000 kilowatt (kW) at 4,160 volts, would be located **in the vicinity** of the mill **and roaster**. These generators would provide sufficient power to **safely shut down the** plant in the event of a power outage. Final design for back up power and sizing of the generators is pending detailed design.

2.1.7.3 Site Layout and Support Facilities

Proposed support facilities would include access roads, laydown areas, maintenance and other support facilities. Figure 2.1.8 presents the site layout.

2.1.7.3.1 Support Facilities

Support facilities would include the mine and mill maintenance shops, laboratory, warehouse, administration buildings, and security buildings. These buildings would typically be insulated pre-fabricated or pre-engineered steel buildings. Heat would be provided by propane gas forced air **or electrical heaters** in the office and personnel buildings and propane gas radiant heat in the maintenance bays. Gas would be provided from individual propane tanks adjacent to each building. Air conditioning would be provided by electrical cooling units.

The truck shop would include five maintenance bays (three large bays and two intermediate to small bays) to support mobile equipment maintenance. In addition, the truck shop would have offices, a lunch room, locker rooms with showers, and crew meeting rooms. An enclosed truck wash facility would be located adjacent to the truck shop. Stationary water monitors would be used to clean mobile equipment. Wash water would be directed to a settling basin where water and solids would be separated. Water would be treated with an oil water separator and re-circulated. Solids collected from the settling basin would be tested and handled as petroleum contaminated soil, if necessary.

The mill maintenance building would house the process maintenance shops, office space, and the warehouse. An outside fenced storage area would be located adjacent to this building.

The laboratory would be located southeast of the roaster facility as shown on Figure 2.1.8. The laboratory would include separate areas for sample preparation, wet analysis, a metallurgical laboratory, a balance room, and offices.

the 900-foot corridor. This double containment would begin at a topographic crest where the pipe grades would begin flowing toward the Pony Express Historic Trail corridor. The lines would continue underground for 450 feet on each side of the Pony Express Historic Trail where they would surface and return to the trench configuration as previously described. This trench would be connected to an emergency spill pond.

In the event of line rupture within this area, the outer containment pipe would be filled with tailings or reclaim water and would discharge where the lines surface and report to the emergency spill pond. Once a leak is detected, the lines would be shut off, repaired, and reburied. The emergency spill pond would be cleaned and materials hauled to the tailings impoundment. No storm water diversion channels would be constructed at the low point where the pipes would be buried; flood waters would be allowed to flow over the road and buried lines. Lines would be buried deep enough to ensure they would not be exposed through scouring during flood events. The emergency spill pond would be designed to contain the 100-year, 24-hour storm event.

2.1.7.2 Electrical Power and Generator Backup

The Project would require up to 75 megawatts (MW) of power. EML would construct an approximately 24 mile long 230-kV powerline within and adjacent to the existing 500-foot wide Falcon-Gondor utility corridor as shown on Figure 2.1.7. The proposed powerline would originate at Mt. Wheeler's Machacek substation, located approximately **0.5 mile north of the Eureka Townsite boundary**. **The specific agreements for providing energy and maintaining the 230-kV powerline have not been finalized. However, these** services that are specific to EML's requirements would be fully funded by EML.

The existing Machacek Substation is fenced (approximately 8.25 acres), and would be upgraded to accommodate the transmission of power for the Project. Upgrades would consist of **a** ring bus, 230-kV circuit breakers, 230-kV air break switches, associated structures, and concrete foundations. The Machacek Substation upgrades, including **a** full ring bus design, would allow isolation of the proposed facilities from other consumers for line faults. This arrangement would likely improve the service reliability for the Eureka community, including Diamond Valley, and the power that would be provided for the Project would not affect the sufficiency of power currently provided to the area.

The Mount Hope 230-kV powerline would run parallel to the existing Falcon-Gondor powerline for the majority of its routing, but would have its own ROW **(first a temporary construction ROW and then a separate ROW for the operation of the powerline)**. The power poles would be steel structures with a rust stained surface, similar to the poles of the existing 345-kV line. These poles would be placed approximately 150 feet (centerline to centerline) from the existing Falcon-Gondor powerline. The power would be transmitted in three phases necessitating three separate conductors, plus one static line. Based on Avian Power Line Interaction Committee recommendations, adequate spacing between conductors would be implemented. Appropriate **applicant committed practices**, including perch deterrents, would be included in the design as identified by the BLM through the POD (Electrical Consultants, Inc. [ECI] 2008). The 230-kV line would enter the Project Area at the southern boundary near the South TSF and tie into a substation located in the mill area (Figure 2.1.5).

- Sulfide oxidation and carbonate buffering.

These reactions would be limited by low sulfide content in the tailings and by the encapsulation of much of the sulfide within gangue minerals. Using a simple mass balance approach to predicting tailings pore water chemistry, the only elements that would be elevated include Al, Sb, fluoride, Fe, and Mn.

The predicted source term chemistry for the tailings indicates that any tailings leachate has potential for elevated concentrations of Al, Cd, fluoride and Mn. The TDS may also be elevated over time due to evapoconcentration of salts in the supernatant pool. However, the overall low sulfide content of the tailings limits the concentration of SO_4 that can be generated from the tailings.

The geochemical characterization work completed indicates that pore water chemistry in the tailings would potentially contain several constituents above applicable standards applied by NDEP. This list includes Al, Sb, fluoride, Fe, and Mn. In addition, As, Cd, Mo, and SO_4 would be also present.

In order to mitigate accumulation of water in the tailings following closure and potential generation of low quality pore water, the tailings would be covered with a low permeability cover of either alluvium or growth medium, or a combination of both, to minimize long-term infiltration into the tailings impoundments. This would effectively reduce the quantity of pore water generated and would reduce the potential environmental risk from the tailings post-closure.

2.1.6.8 Closure

The North and South TSFs would undergo a draindown period, during which time, the tailings would consolidate to allow equipment access for recontouring. Consolidation is expected to take a number of years while seepage is actively evaporated. The final disposition of the draindown fluid would depend on the water quality and other site-specific environmental factors. Possible long-term management scenarios could include direct evaporation or ET. Specifics on the tailings closure are included in Section 2.1.16.8.3.

2.1.7 Project Infrastructure

2.1.7.1 Pipeline Utility Crossing

The tailings and reclaim line configurations described in Section 2.1.6.1 would be applied to the majority of the tailings and reclaim line sections. However, where the tailings and reclaim lines cross the Pony Express Historic Trail, additional **design elements have been provided. These additional elements provide protection from potential release of process water while minimizing visual impacts within a 900-foot wide buffer along the Pony Express Historic Trail.**

To minimize visual impacts, these lines would be buried where they are within 450 feet of the Pony Express Historic Trail. As a means of preventing discharge in the event of a line break, the tailings lines would be encased inside an approximately 36-inch diameter pipe and the reclaim line in an approximately 24-inch diameter pipe, and both would be placed below grade through such they would be less available for oxidation and acid generation; and, as a result, the actual reactivity is likely to be considerably less than that indicated by an empiric approach like ABA. By contrast, carbonate minerals would be present as a cement or matrix mineral in the main fabric of the tailings. With sulfides in the tailings, it is likely that some secondary minerals containing Fe, arsenic (As), Cu, Pb, and Zn would form over time.

Tailings whole rock analysis results indicate elevated concentrations of antimony (Sb), As, Cd, Mo, tin (Sn), tungsten (W), and Zn at three or more times above average crustal composition as defined in Hem (1985). Lithium (Li), Mn, S, and thalium (Th) would be elevated but would be less than three times the average crustal abundance. These elements are enriched within the entire Mount Hope mineralizing system.

The S chemistry is low in the tailings compared to unprocessed ore samples, indicating efficient removal of molybdenite, the most common and abundant sulfide mineral in the deposit. Buffering material is also scarce in the tailings as a result of low carbonate content.

The AGP of the various ore types is not directly related to the rock type or the alteration type but is directly proportional to sulfide content. Typically, tailings samples with S above 0.15 percent (by weight) would be predicted to be net acid generating (NAG), due to the negligible carbonate content. In general, acid generation from the tailings is low due to the low sulfide content of the molybdenite ore and the fact that the majority of sulfide in the ore is molybdenite.

MWMP leachates show lower pH **(potential of Hydrogen)** (acidity) and elevated concentrations of Sb, Cd, fluoride, Mn, mercury (Hg), and nickel (Ni); however, the majority of results show low TDS leachate with **sulfate (SO_4)** less than 150 milligrams per liter (mg/L) (see Table 3.3-2).

The humidity cell tests (HCT) and NAG results show similar low reactivity of the tailings, but both tests indicate that over time the tailings would become acidic. This is most likely due to the difference between the reaction rates of the buffering minerals and sulfide oxidation rates in the tailings.

HCT leachate values were compared to NDEP comparative values. Comparison to the NDEP values is not strictly applicable because the tailings impoundment would be a lined, zero discharge facility. However, Al, Sb, Cd, fluoride, Mn, Mo, and SO_4 all show concentrations that would be above comparative values (see Table 3.3-2).

The low amount of metals leached from the HCT confirms the interpretation that the majority of commonly regulated elements would be encapsulated in the tailings solids and would not be available for leaching under natural environmental conditions. Subsequent mineralogical and diagnostic sequential extraction tests of the HCT residues have confirmed the sulfides would be largely encapsulated in coarse grains of quartz and feldspar.

The geochemical evolution of the humidity cells is interpreted to represent the transition over time of the following:

- Rinsing of soluble secondary minerals and sorbed species (mineral species with weak chemical bonds);
- Buffering by secondary minerals; and

stormwater runoff from the TSF embankments. The underdrain system would allow for continuous collection of underdrain solution flow from the South TSF site while the North TSF is in operation and the expansion is being constructed.

The Phase 1 pond would be sized to store approximately 4.0 million gallons of operating volume plus 1.0 million gallons of contingency operating volume, 2.1 gallons for the flow generated from 24 hours of drain down, and 6.1 million gallons generated by the 100-year, 24-hour storm event (2.83 inches). The total volume of the Phase 1 pond would be 13.2 million gallons which does not include the capacity for three feet of freeboard. With freeboard the total capacity would be 15.6 million gallons.

The Phase 2 pond would add 33.3 million gallons of capacity to the pond system. The combined capacity of the Phase 1 and Phase 2 ponds would be 4.0 million gallons of operating volume, 6.9 million gallons for 24 hours of drain down from the ultimate TSF basin, and 34.8 million gallons generated by the 100-year, 24-hour storm runoff from the downstream slope of the TSF ultimate embankment. The total volume of both ponds would be 46.2 million gallons. The Phase 2 pond design provides three feet of freeboard and a spillway connecting both ponds.

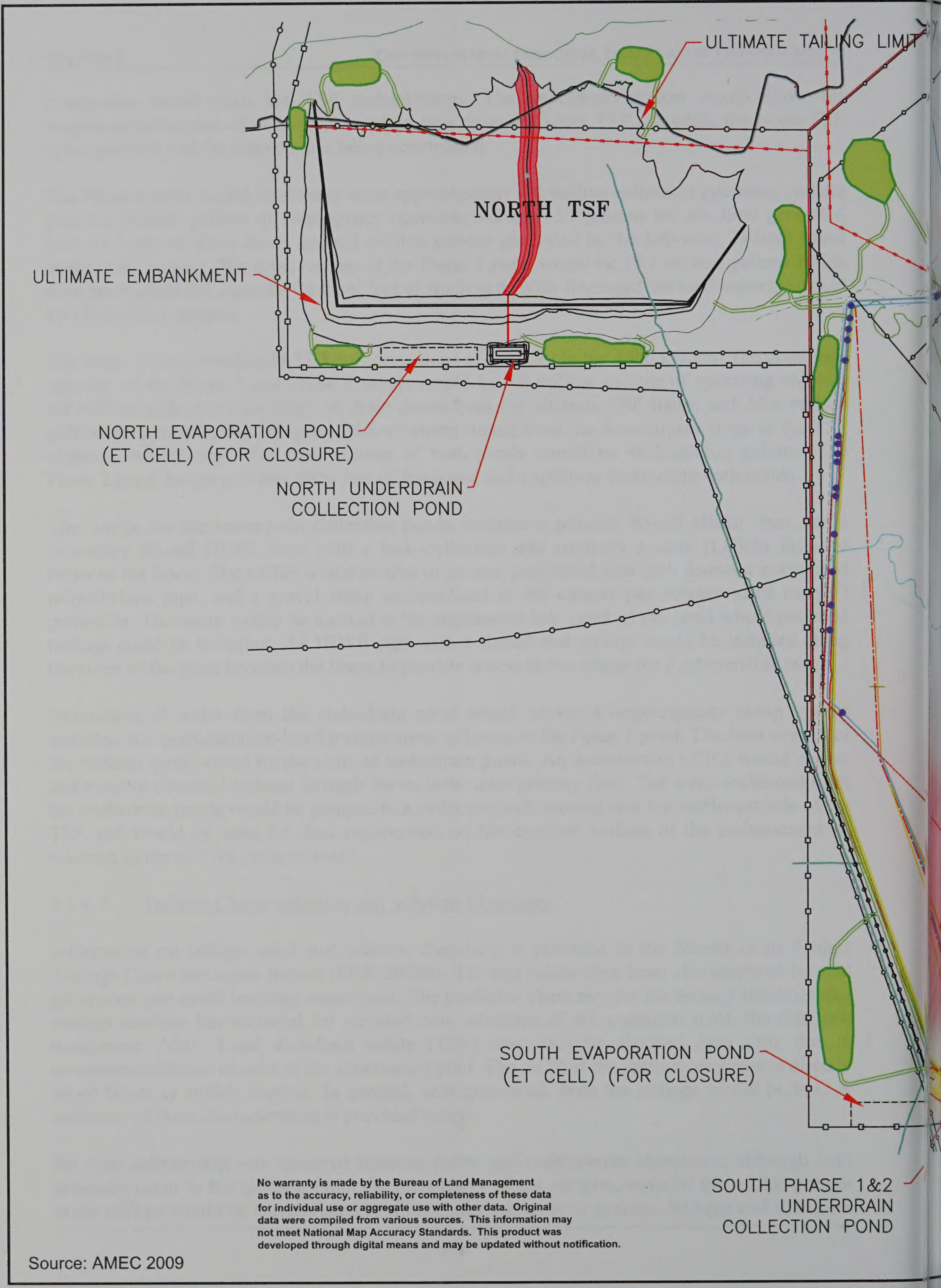
The design for the underdrain collection ponds includes a primary 80-mil HDPE liner and a secondary 80-mil HDPE liner with a leak collection and recovery system (LCRS) installed between the liners. The LCRS would consist of geonet, perforated four inch diameter corrugated polyethylene pipe, and a gravel sump encapsulated in ten **ounces per square yard** (oz/yd^2) geotextile. The sump would be located at the engineered low point of the pond where potential leakage could be collected. An HDPE pipe with a slotted end section would be installed along the slope of the pond between the liners to provide access to the sumps for a submersible pump.

Evacuation of water from the underdrain pond would be via a large-capacity pump system installed in a geomembrane-lined reclaim sump adjacent to the Phase 1 pond. The liner system of the reclaim sump would be the same as underdrain ponds. An independent LCRS would collect and monitor potential leakage through the reclaim sump primary liner. The water reclaimed from the underdrain ponds would be pumped to a collection tank located near the northwest side of the TSF and would be used for dust suppression on the exposed surface of the embankment or returned to the mill for process water.

2.1.6.7 Tailings Characterization and Solution Chemistry

Information on tailings solid and solution chemistry is provided in the Mount Hope Project Tailings Characterization Report (SRK 2008b). Tailings solids have been characterized by acid generation and metal leaching assessment. The predicted chemistry for the tailings indicates that tailings leachate has potential for elevated concentrations of Al, cadmium (Cd), fluoride, and manganese (Mn). **Total dissolved solids** (TDS) may also be elevated over time due to evapoconcentration of salts in the supernatant pool. The AGP of the various ore types is directly proportional to sulfide content. In general, acid generation from the tailings would be low. A summary of these characteristics is provided below.

No clear relationship was observed between pyrite and molybdenite abundance, although both generally occur in the tailings. From the mineralogy of the samples, some of the sulfide present in the tailings would be encapsulated in silicate minerals (mainly potassic feldspar and illite). As


ULTIMATE TAILING LIMIT
NORTH TSF
ULTIMATE EMBANKMENT
NORTH EVAPORATION POND
(ET CELL) (FOR CLOSURE)
NORTH UNDERDRAIN
COLLECTION POND
SOUTH EVAPORATION POND
(ET CELL) (FOR CLOSURE)
SOUTH PHASE 1&2
UNDERDRAIN
COLLECTION POND

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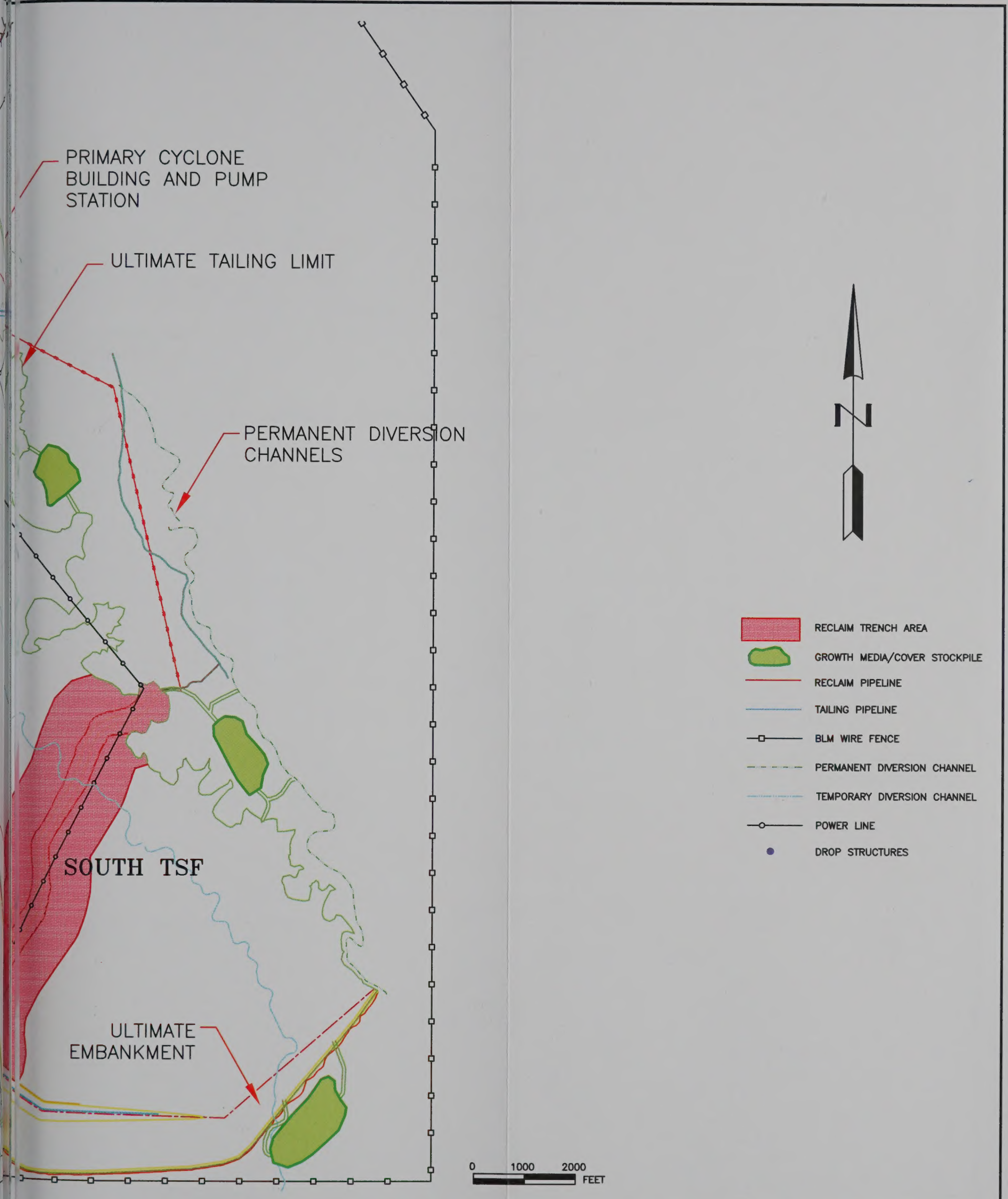
PRIMARY CYCLONE BUILDING AND PUMP STATION
ULTIMATE TAILING LIMIT
PERMANENT DIVERSION CHANNELS
SOUTH TSF
ULTIMATE EMBANKMENT
N
🟥 RECLAIM TRENCH AREA
🟩 GROWTH MEDIA/COVER STOCKPILE
RECLAIM PIPELINE
TAILING PIPELINE
BLM WIRE FENCE
PERMANENT DIVERSION CHANNEL
TEMPORARY DIVERSION CHANNEL
POWER LINE
● DROP STRUCTURES
0
1000
2000
FEET

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FILE NAME: p1635_Fig2-1-17_TSF&ReclaimSlotLocations.dwg

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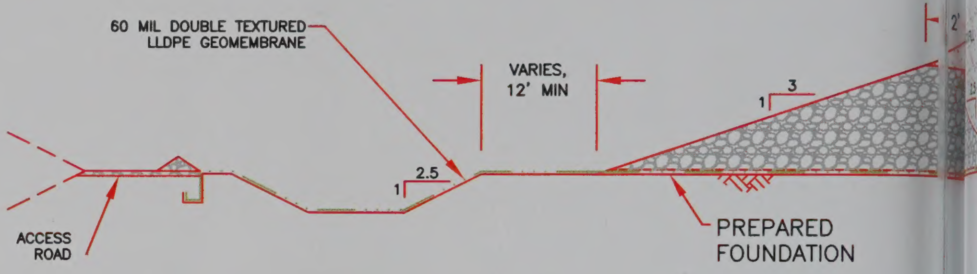
Tailings Storage Facility and Reclaim Slot Locations

Figure 2.1.17


60 MIL DOUBLE TEXTURED
LLDPE GEOMEMBRANE
VARIES,
12' MIN
2'
3
1
2.5
1
ACCESS
ROAD
PREPARED
FOUNDATION

A

ULTIMATE EMBANKMENT TOE DIVERSION CHANNEL SECTION

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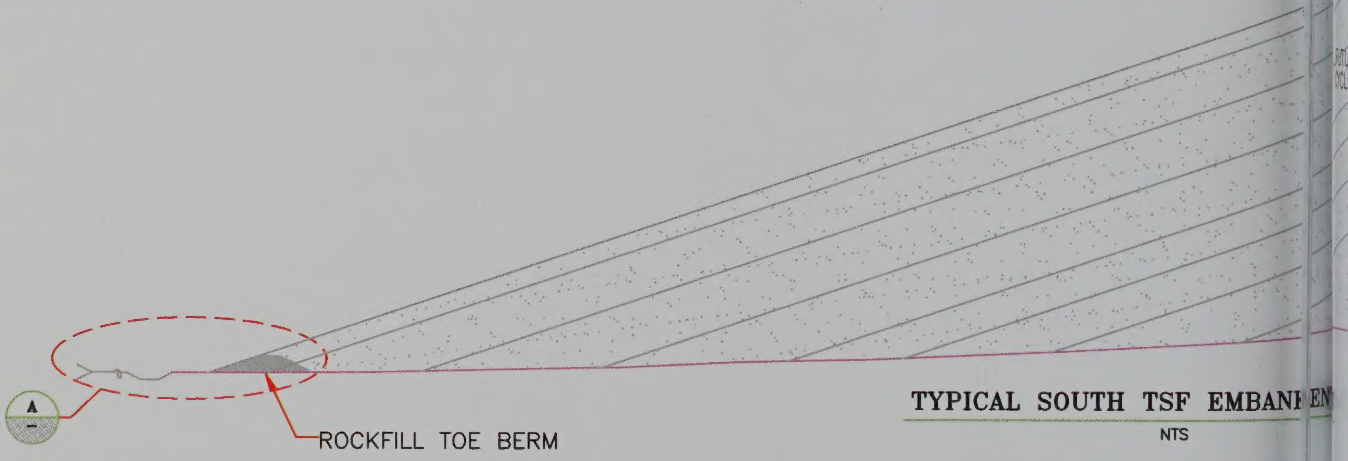
A
ROCKFILL TOE BERM

TYPICAL SOUTH TSF EMBANK

NTS

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data were compiled from various sour
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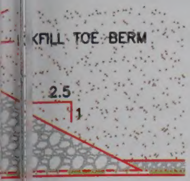
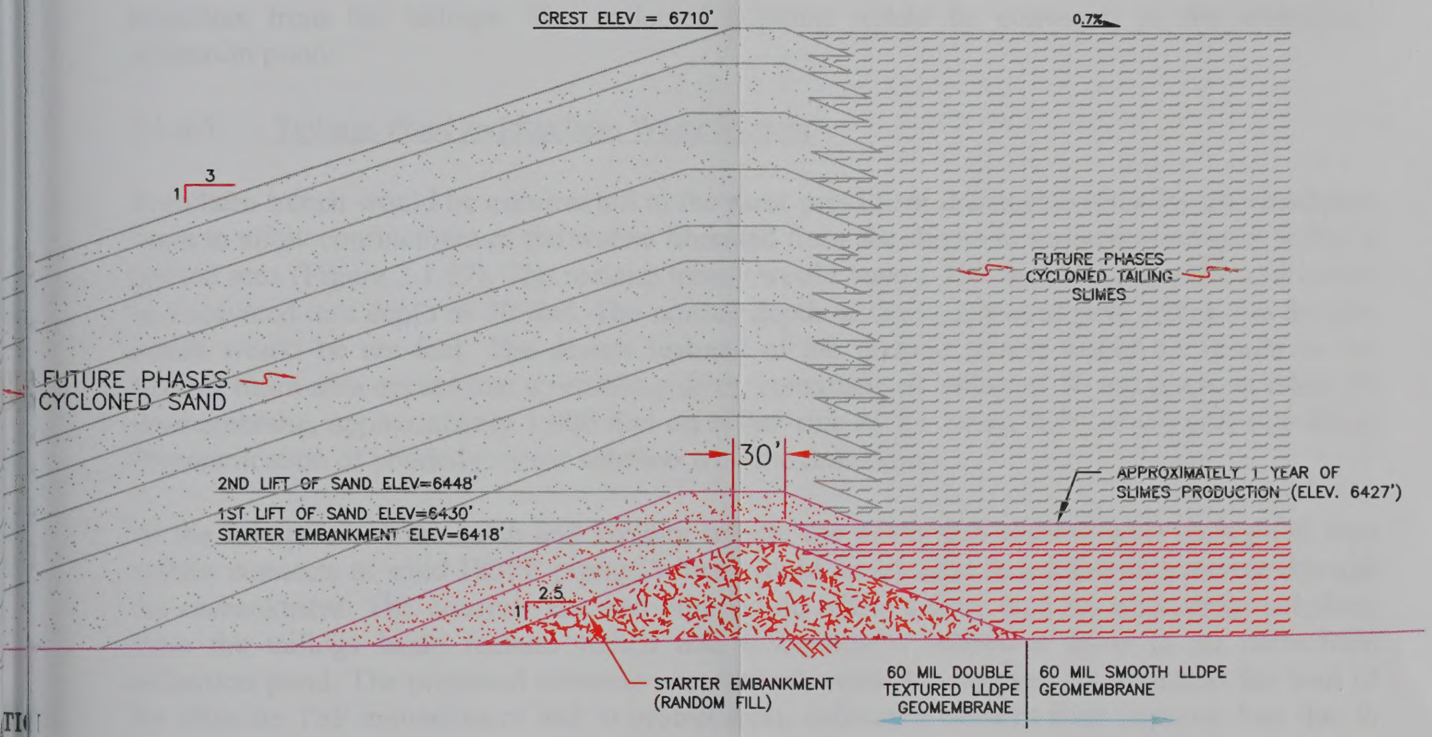


FILL TOE BERM
2.5
1



CREST ELEV = 6710'
0.7%
3
1
FUTURE PHASES CYCLONED TAILING SLIMES
FUTURE PHASES CYCLONED SAND
30'
2ND LIFT OF SAND ELEV=6448'
1ST LIFT OF SAND ELEV=6430'
STARTER EMBANKMENT ELEV=6418'
APPROXIMATELY 1 YEAR OF SLIMES PRODUCTION (ELEV. 6427')
2.5
1
STARTER EMBANKMENT (RANDOM FILL)
60 MIL DOUBLE TEXTURED LLDPE GEOMEMBRANE
60 MIL SMOOTH LLDPE GEOMEMBRANE

ification.

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Tailings Storage Facility Typical Embankment Section and Details

Figure 2.1.16

2.1.6.4 Tailings Impoundment

The tailings impoundment area, like the embankment, would be constructed in phases. A starter facility with eight months of storage capacity would be initially constructed, followed by subsequent phases of construction completed in order to maintain at least one year's production.

The impoundment area foundation would be cleared, stripped of roots and stumps, stripped of growth media, smoothed, and underlain with a 60-mil LLDPE geomembrane. An 18-inch thick nominal drainage blanket and solution collection piping system would be placed over the geomembrane in the basin and embankment foundation. The drainage blanket material would be graded to prevent piping of fines from overlaying tails.

The solution collection piping system at the base of the drainage blanket would consist of a series of perforated smooth interior corrugated pipes designed to collect and remove solution that emanates from the tailings. The collected solution would be conveyed to the underdrain collection pond.

2.1.6.5 Tailings Pond and Reclaim Water System

A reclaim trench would be constructed in the most prominent drainage within the impoundment basin to allow confinement of the waters liberated from the slimes in a supernatant pool within a limited area (Figure 2.1.17). The reclaim trench would have a 150-foot bottom width and would be excavated to a depth of 30 feet. The normal depth of the supernatant pool within the reclaim trench would be ten feet. The design features of the reclaim trench would be similar to the tailings basin area except that a retarding layer, consisting of ballasted 40 mil polyvinylchloride geomembrane, approximately 1,000 feet on either side of the center line, which prevents direct communication of ponded process solution with the drain layer.

At the low point of the basin and reclaim trench, the perforated smooth wall corrugated pipe system connects to solid HDPE piping, which would be encased in reinforced concrete through the embankment. The concrete encased pipe would allow a flow path for underdrain solutions from the tailings basin reclaim trench and embankment collection areas to an underdrain collection pond. The proposed concrete encasement would be designed to withstand the load of the ultimate TSF embankment and to protect main collection headers from capacity loss due to pipe deflection.

Water would be reclaimed from the tailings impoundment pond with a reclaim water system consisting of vertical pumps mounted on barges. The water would be pumped to an on shore booster station. The reclaim water system would supply water to the tailings cyclone classification system and the process water tank. Figure 2.1.5 shows the locations of the reclaim line.

2.1.6.6 Underdrain Collection Pond

Two underdrain collection ponds, Phase 1 and Phase 2, would be constructed at the South TSF, and a single underdrain collection pond would be constructed at the North TSF. The Phase 1 pond would be constructed prior to startup, and the Phase 2 pond would be constructed during the fourth year of operation. The underdrain ponds would collect both underdrain seepage and

Coarse tailings material would be required as construction material for the tailings dam. A cyclone classification system would be installed to separate the coarse tailings fraction from the mill tailings stream. The underflow (coarse fraction) from the cyclone classification system would be deposited on the embankment to construct the embankment raises, and the overflow would be deposited into the TSF impoundment as slimes.

2.1.6.2 Foundation Preparation

Prior to construction, the embankment and impoundment foundation surfaces would be cleared and stripped of roots, stumps, and growth media. Growth media would be stockpiled outside of the ultimate impoundment footprints to prevent disturbance and managed according to the growth media salvage protocols in Section 2.1.14.9. The TSF foundation surfaces would be shaped and smoothed prior to liner installation.

Slash from large trees, shrubs, and roots that are encountered during growth media salvage operations would be mechanically separated from growth media as feasible. This slash material would be stockpiled separately from the growth media where it may be burned, used by the public as fire wood, used in final reclamation as habitat enhancements, or hauled off-site to an approved landfill.

2.1.6.3 Embankments

The starter embankment sections for both the South and North TSF sites would be constructed of compacted random fill and rock fill for startup operations. Figure 2.1.16 presents typical embankment sections and details. Cycloned sand raises would be placed above the earthen starter embankment crest to the ultimate height. A toe berm would be constructed at the downstream limits of the ultimate cycloned sand embankment. An embankment underdrain system would be constructed in the downstream sand embankment section with finger drains for routing drainage to a collection pond. A double textured 60-mil LLDPE geomembrane would extend beneath the embankment.

The starter embankment has been sized for approximately eight months of storage capacity, with upstream and downstream slopes of 2.5H:1V. The crest width is designed to be approximately 30 feet wide to accommodate cyclone dam building and vehicle/equipment access as well as practical considerations for traffic and safety during construction.

Cyclone underflow, the slurry that discharges from the bottom of the conical-shaped cyclone, would be directed to the embankment footprint for use in dam construction. These primarily sandy materials would be spread and compacted to provide structural stability for the embankment. Raises above the starter embankment would be constructed without a lined face. Cyclone embankments are widely used in numerous mineral commodity operations on all continents, except Australia. Examples in the western U.S. include Robinson, Morenci, and Bingham Canyon.

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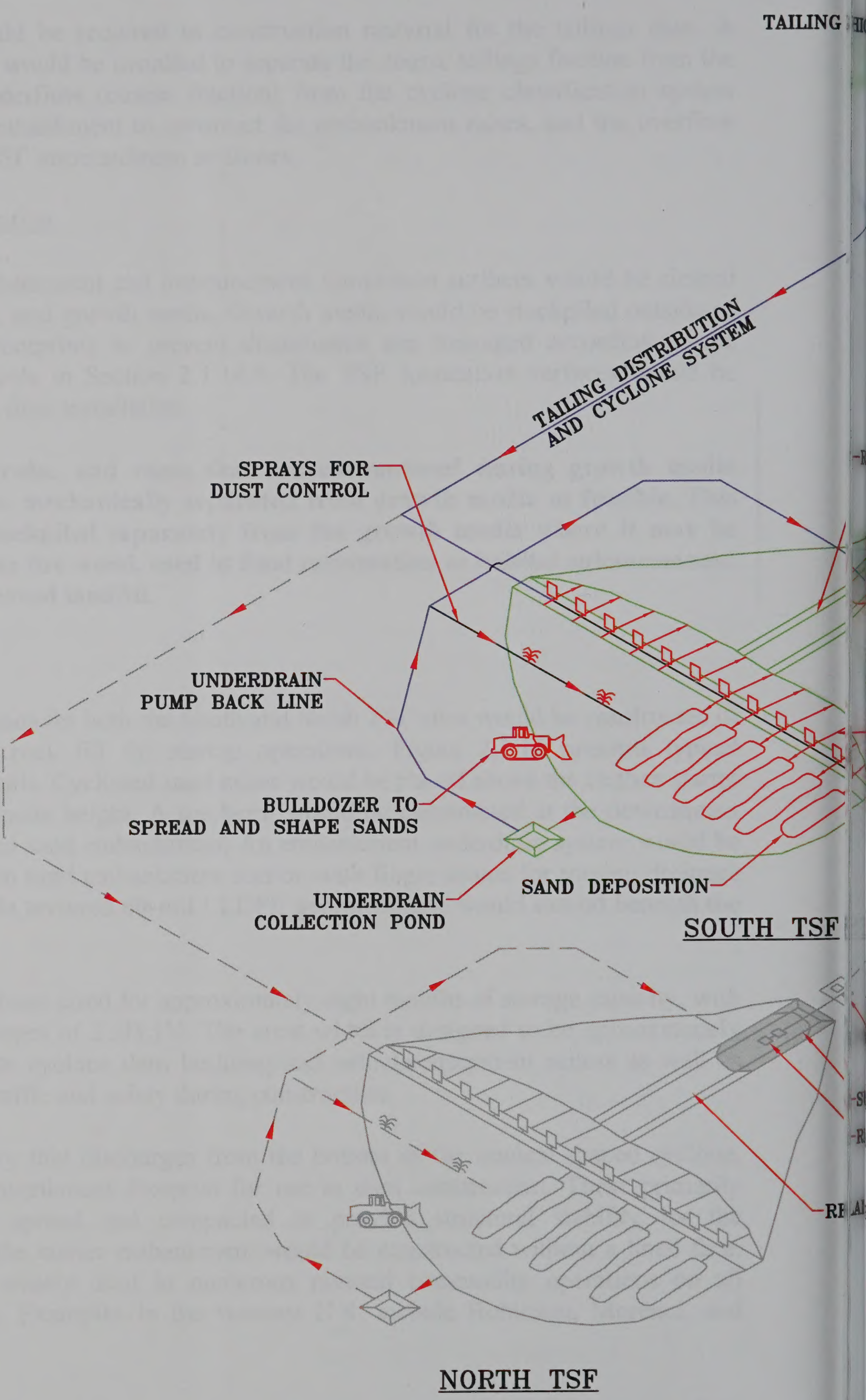
TAILING
TAILING DISTRIBUTION AND CYCLONE SYSTEM
SPRAYS FOR DUST CONTROL
UNDERDRAIN PUMP BACK LINE
BULLDOZER TO SPREAD AND SHAPE SANDS
UNDERDRAIN COLLECTION POND
SAND DEPOSITION
SOUTH TSF
NORTH TSF
RE

Source: AMEC 2009

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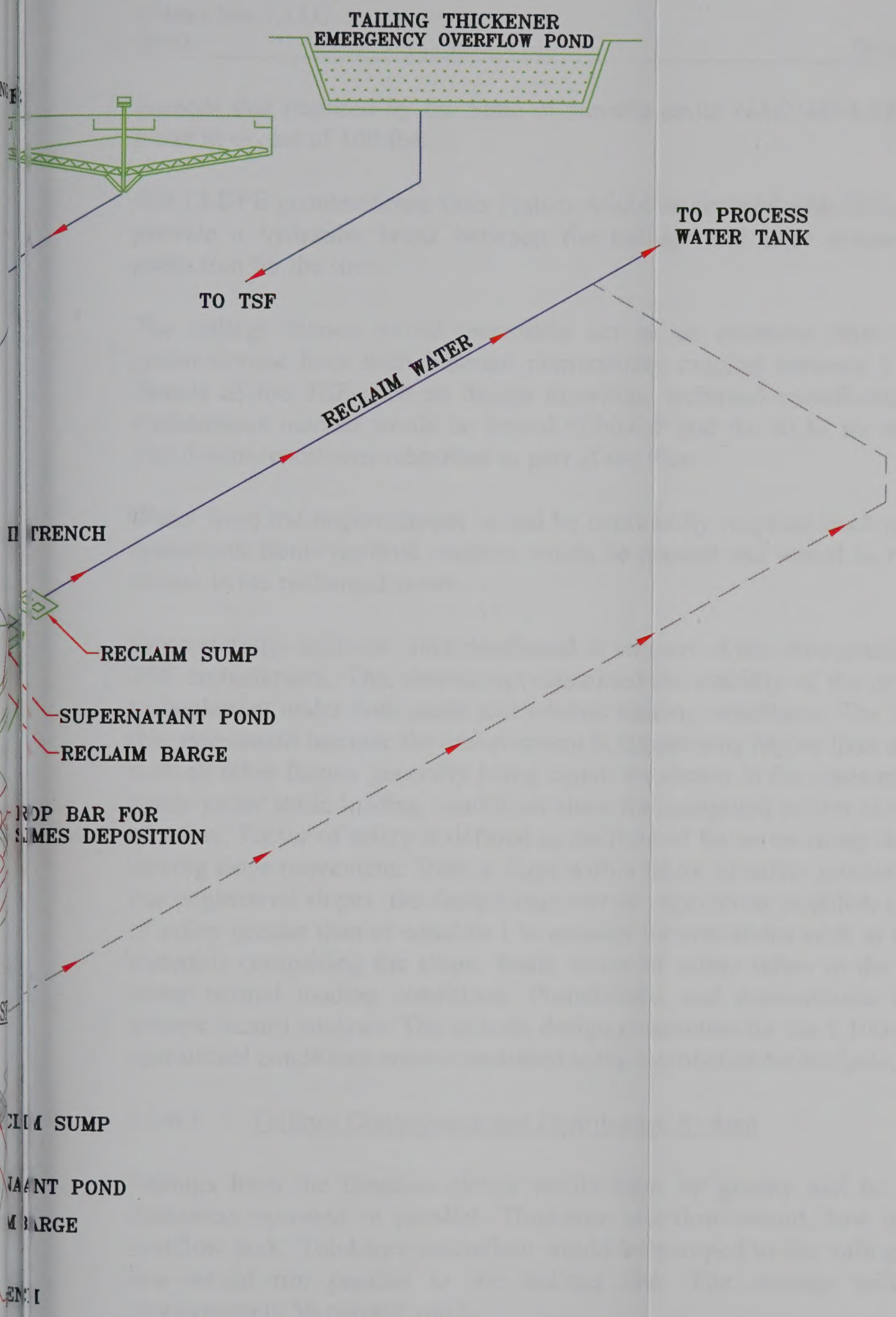
TAILING THICKENER
EMERGENCY OVERFLOW POND
TO PROCESS
WATER TANK
TO TSF
RECLAIM WATER
TRENCH
RECLAIM SUMP
SUPERNATANT POND
RECLAIM BARGE
DROP BAR FOR
SLIMES DEPOSITION
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NT POND
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Schematic Tailings Storage Facilities

Figure 2.1.15

exceeds that required by the State of Nevada under NAC 445A.437 for facilities with ground water in excess of 100 feet.

The LLDPE geomembrane liner system would be covered with 18 inches of drainage material to provide a hydraulic break between the tailings and liner system and to provide puncture protection for the liner.

The tailings slimes would essentially act as an extended liner system above the LLDPE geomembrane liner with inherent permeability ranging between **1 x** 10^{-6} and **1 x** 10^{-7} cm/s. Details of the TSF such as design drawings, technical specifications, and an operations and maintenance manual would be issued to NDEP and the BLM for review prior to construction. The design report was submitted as part of the Plan.

Water from the impoundment would be continually recycled back to the process stream during operations. Some residual reagents would be present and would be recycled back to the process stream in the reclaimed water.

Slope stability analyses were conducted in support of the conceptual design of the Mount Hope TSF embankment. This assessment examined the stability of the proposed South TSF ultimate embankment under both static and seismic loading conditions. The South TSF was selected for this assessment because the embankment is appreciably higher than the North TSF embankment, with all other factors generally being equal. As shown in the assessment, the proposed facility is stable under static loading conditions since the computed values exceed the prescriptive factors of safety. Factor of safety is defined as the ratio of forces resisting slope movement to the forces driving slope movement. Thus, a slope with a factor of safety greater than 1 is considered stable. For engineered slopes, the design engineer or regulations establish minimum acceptable factors of safety greater than or equal to 1 to account for conditions such as variability in the strength of materials comprising the slope. Static factor of safety refers to the factor of safety of a slope under normal loading conditions. Probabilistic and deterministic methods were used in the seismic hazard analysis. The seismic design parameters for the 1,100-year return period event for operational conditions were determined using a probabilistic analysis.

2.1.6.1 Tailings Conveyance and Distribution System

Tailings from the flotation circuit would flow by gravity and be distributed to two tailings thickeners operated in parallel. Thickener overflow would flow by gravity to the thickener overflow tank. Thickener underflow would be pumped to the tailings impoundment. A reclaim line would run parallel to the tailings line. The average tailings underflow would be approximately 50 percent solids.

An access road would typically be constructed parallel to, and upgradient from the lines, separated by a berm. The tailings line would be comprised of two **24**-inch diameter pipes. The reclaim line would be an approximately 36-inch diameter high density polyethylene (HDPE) pipe. An emergency spill trench would be constructed downgradient from the lines, to direct any release to adjacent spill ponds. A storm water diversion channel would be constructed upgradient from the road, with the design based on the 100-year, 24-hour storm event.

would be transferred from the TMO day bins through a series of bins and conveyors to a drum loader.

Roaster off gas would contain S oxides (mostly sulfur dioxide [SO_2]), moisture, nitrogen (N), excess oxygen and entrained dust particles consisting of Mo oxides and molybdenite. The off gas treatment would consist of dust recovery followed by wet gas scrubbing to remove the SO_2. This scrubbing system would produce a gypsum solid, which depending on regulatory limitations, could be recycled to local agricultural operations as a soil supplement.

Up to 50 percent of TMO produced could be converted to FeMo alloy using a metallothermic process. Essentially, the process would involve reduction of TMO and iron oxide by aluminum (Al) and silicon (Si). The process is highly exothermic and would reach completion within ten to 20 minutes after ignition. A typical batch would consist of 2,000 pounds of TMO, to which is added Al metal powder, Fe oxide ore (hematite or magnetite), and ferrosilicon alloy (FeSi). Lime and calcium (Ca)-Al would be added for fluxing, as well as dust recycled from the baghouse. The mixture would be thoroughly blended, loaded into a refractory lined vessel and ignited. Combustion fumes and dust would be collected through a hood and filtered through a high temperature baghouse. After 24 hours, the metal solidifies and cools and would be lifted out with crane operated tongs. The remaining slag and sintered sand on the metal button would be knocked off. The alloy would be quenched in water and allowed to cool for two to four hours. The button would be broken down by hand sledging or with a rock breaker to a size that could be fed to jaw and cone crushers for final size reduction and packaging. The slag would be processed to recover occluded metal shots and prills for recycling into future batches. The slag recovery process would include crushing and grinding, followed by gravity concentration. The slag, being a glassy material of the flux oxides, would be inert and suitable for waste disposal in the Class III landfill. **Prior to disposal in a Class III landfill, EML would characterize the slag, as required by applicable NDEP and EPA regulations.**

2.1.6 Tailings Storage Facilities

The TSFs would consist of two separate embankments constructed in phases, impoundments, tailings conveyance and distribution system, reclaim recovery systems, and tailings draindown recovery systems (Figure 2.1.15). Figure 2.1.5 shows the locations of the North and South TSFs.

The tailings production rate would range from approximately 21 to 23 million tons per year (tpy) for the 44 years of operation. The combined storage capacity of the TSFs is approximately 966 million dry tons. EML selected these two facility locations based on the analysis of multiple sites. This analysis is incorporated in the EIS as Appendix **B**.

The South TSF would have a capacity of approximately 790 million tons, which would equate to approximately 36 years of production. The North TSF would be constructed before the South TSF facility reaches capacity at Year 36, to contain 176 million tons, which would equate to approximately eight years of production.

The TSF embankment foundation and impoundment basin would be lined using a 60 mil (0.06 inch) linear low density polyethylene (LLDPE) geomembrane, with a coefficient of permeability (K) of 1×10^{-11}cm/s to provide fluid containment. This level of containment

Concentrate from the **seventh** cleaner flotation stage would be thickened in the final concentrate thickener. The thickener underflow would be pumped to one of four stock tanks in the ferric chloride leach plant.

2.1.5.4 Ferric Chloride Leaching and Dewatering

The primary purpose of the ferric chloride leach process is to reduce the concentration of impurities such as copper (Cu), lead (Pb), iron (Fe), and zinc (Zn) in the molybdenite concentrate. Flotation concentrates that meet the specifications would bypass the leach circuit and proceed to the dewatering circuit.

Flotation concentrate would be stored in one of four stock tanks, each sized to store 24 hours worth of production. Concentrate in each stock tank would be sampled and assayed for Mo, Cu, Pb, Fe, and Zn. Based on the analysis, the concentrate slurry would be pumped to the ferric chloride leach circuit or bypassed to two filters. From the filters, the filter cake would discharge to conveyors to be transferred to dryers.

Flotation concentrate sent to the ferric chloride leach circuit would be pumped to six agitation tanks operating in series. In the leach tanks, impurities would be dissolved in a ferric chloride and hydrochloric acid solution at 180 to 200 degrees Fahrenheit (ºF) for 16 to 24 hours. The leached concentrate slurry would then flow to the leach thickener. After thickening, the concentrate would be filtered through two filters and filter cake would discharge to a conveyor to be transferred to dryers. The dried concentrate would be conveyed to the roaster feed bin.

2.1.5.5 Technical Grade Molybdenite Oxide Plant

Molybdenite concentrate would be roasted to produce TMO in two multiple hearth furnaces, operating in parallel. Concentrate would primarily come from the on-site mill. However, concentrate from offsite may be used and toll roasted to supplement the on-site concentrate to allow the roaster to operate on a more consistent basis at the designed and permitted capacity. The delivery of the off-site concentrate would be up to seven 22-ton capacity highway trucks per day. The transportation off-site of the roasted concentrate would require up to nine 22-ton capacity highway trucks every two days.

Concentrate would be discharged from the four roaster feed bins and conveyed to feed ports at the top of the roasters. In the roaster, the concentrate would travel down through multiple hearths via the raking action of rabble arms that would be attached to a rotating center shaft. Oxidation of the concentrate would take place as the material traveled through the furnace, which would operate at 1,000 to 1,300 ºF. Oxygen would be supplied by ambient air pulled into the furnace through the hearth windows. Final TMO product would be transferred to the product packaging circuit.

The TMO may be packaged in various types of containers such as cans, drums, or super sacks or made into briquettes for shipment in drums or super sacks. TMO made into briquettes would be transferred to the pug mill where ammonium hydroxide would be added to create a paste. The paste would be discharged to a briquette machine, and briquettes would be discharged onto a curing conveyor. Briquettes would be transferred to drum loaders. TMO to be shipped as powder transferred from the crusher discharge hopper to the coarse ore transfer conveyor by a belt feeder.

A stockpile feed conveyor would carry primary ore (nominal six-inch crushed size) from the primary crusher onto the coarse ore stockpile. A dry cartridge filter type dust collector system would be installed in the crushing area to control dust at the crusher discharge hopper and the belt feeder. A water spray system would be used for dust suppression at the dump pocket hopper. A water spray system would be installed at the discharge point of the stockpile feed conveyor to the coarse ore stockpile to suppress dust generated from material discharge onto the pile.

Primary crushed ore would be stockpiled on a lined coarse ore stockpile. A reclaim tunnel beneath the stockpile with four reclaim belt feeders would discharge onto the SAG mill feed conveyor. The coarse ore stockpile would have a capacity of approximately 300,000 tons. The live capacity (material that can be recovered by the feeders without working the stockpile) would be approximately 68,000 tons. During periods of downtime on the crushing and coarse ore conveyor system, dozers or other equipment would push ore from the perimeter areas of the stockpile into the reclaim feeders. A dry cartridge filter type dust collector system would be installed to control dust at the discharge of the reclaim feeders.

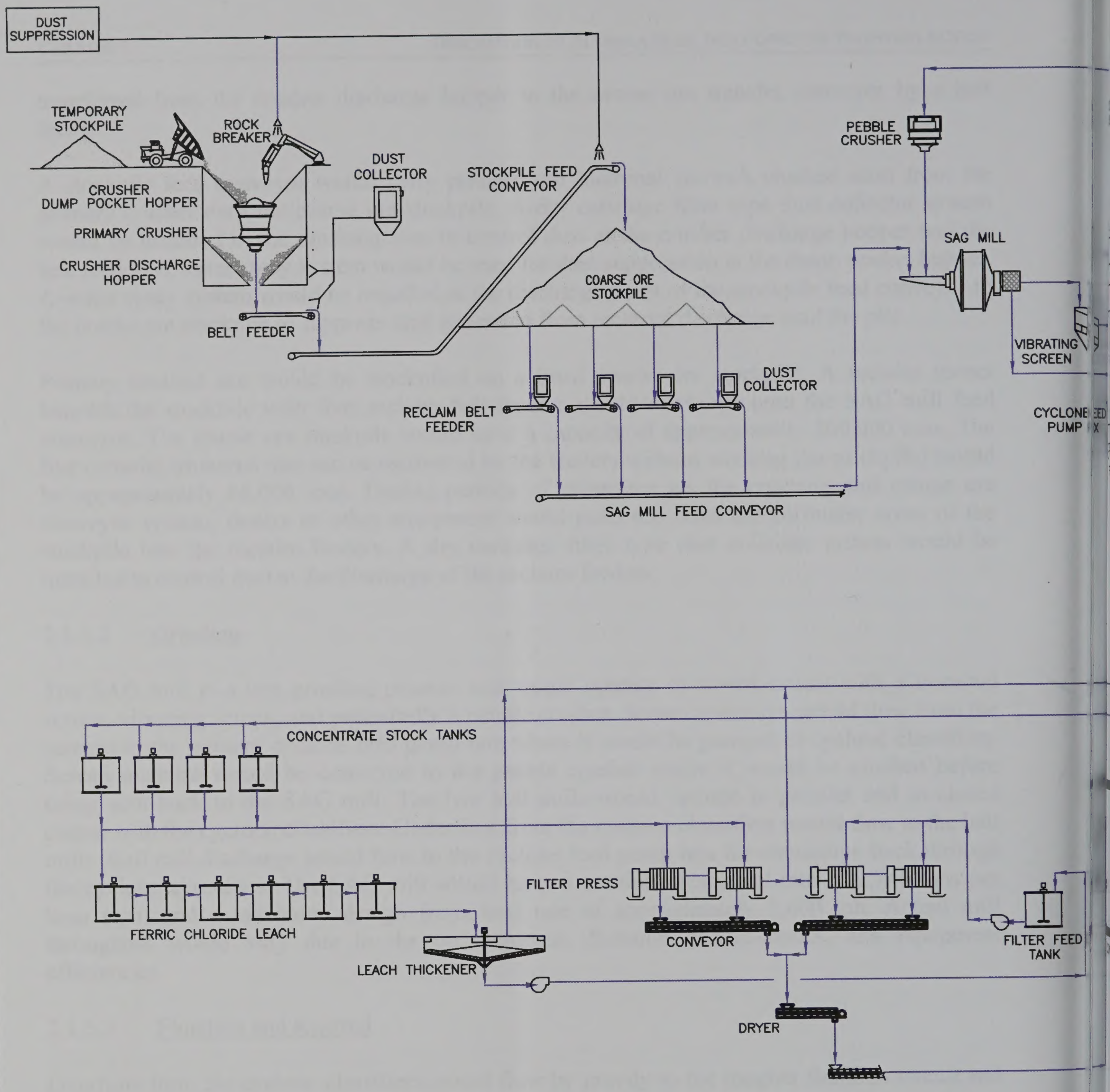
2.1.5.2 Grinding

The SAG mill is a wet grinding process and would operate in closed circuit with a trommel screen, vibrating screen, and **potentially a** pebble crusher. Screen undersize would flow from the screens to the primary cyclone feed pump box where it would be pumped to cyclone classifiers. Screen oversize would be conveyed to the pebble crusher where it would be crushed before being sent back to the SAG mill. The two ball mills would operate in parallel and in closed circuit with the cyclone classifiers. Underflow from the cyclone classifiers would flow to the ball mills. Ball mill discharge would flow to the cyclone feed pump box for circulation back through the cyclone classifiers. The SAG mill would have a nominal fresh feed rate of 2,746 tons per hour (tph) and a maximum design fresh feed rate of approximately 3,600 tph. Actual mill throughput would vary due to the ore hardness, flotation characteristics, and equipment efficiencies.

2.1.5.3 Flotation and Regrind

Overflow from the cyclone classifiers would flow by gravity to the rougher flotation circuit and further to the cleaner and cleaner scavenger circuits. There would be two rows of eight rougher flotation cells. The rougher flotation concentrate from the two rows would flow by gravity to the rougher concentrate sump from which it would be pumped to the cleaner flotation cells. Tailings from the rougher flotation cells would flow to the tailings thickener.

Rougher concentrate would proceed to the first cleaner flotation cells and the first cleaner scavenger flotation cells. Tailings from these float stages would join the rougher tailings stream and be sent to the tailings thickener. Should the tailings be high in Mo, the cleaner scavenger tails would be recycled to rougher feed. The first cleaner concentrate would be reground in the **regrind** mill operated in closed circuit with cyclone classifiers. The regrind cyclone classifier underflow would report back to the regrind mill and the overflow to the second, third, fourth, fifth**, sixth, and seventh** cleaner flotation stages.


DUST SUPPRESSION
TEMPORARY STOCKPILE
ROCK BREAKER
CRUSHER DUMP POCKET HOPPER
PRIMARY CRUSHER
CRUSHER DISCHARGE HOPPER
BELT FEEDER
DUST COLLECTOR
STOCKPILE FEED CONVEYOR
COARSE ORE STOCKPILE
RECLAIM BELT FEEDER
DUST COLLECTOR
SAG MILL FEED CONVEYOR
PEBBLE CRUSHER
SAG MILL
VIBRATING SCREEN
CYCLONE FEED PUMP BOX
CONCENTRATE STOCK TANKS
FERRIC CHLORIDE LEACH
LEACH THICKENER
FILTER PRESS
CONVEYOR
FILTER FEED TANK
DRYER

Source: M3 2009

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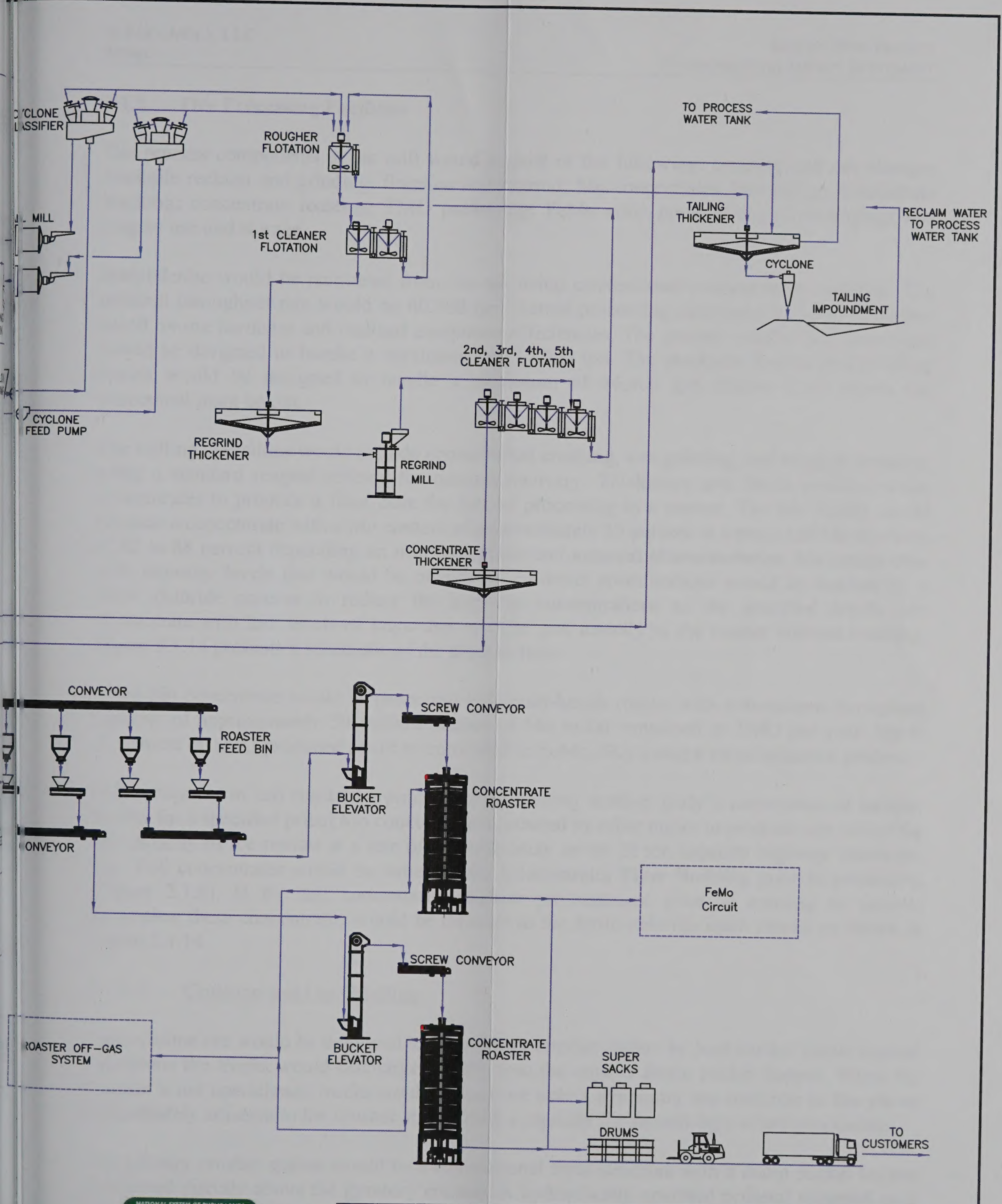
Y'CLONE
ASSIFIER
ROUGHER
FLOTATION
TO PROCESS
WATER TANK
TAILING
THICKENER
RECLAIM WATER
TO PROCESS
WATER TANK
L MILL
1st CLEANER
FLOTATION
CYCLONE
TAILING
IMPOUNDMENT
2nd, 3rd, 4th, 5th
CLEANER FLOTATION
CYCLONE
FEED PUMP
REGRIND
THICKENER
REGRIND
MILL
CONCENTRATE
THICKENER
CONVEYOR
SCREW CONVEYOR
ROASTER
FEED BIN
BUCKET
ELEVATOR
CONCENTRATE
ROASTER
ONVEYOR
FeMo
Circuit
SCREW CONVEYOR
ROASTER OFF-GAS
SYSTEM
BUCKET
ELEVATOR
CONCENTRATE
ROASTER
SUPER
SACKS
DRUMS
TO
CUSTOMERS

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FILE NAME: p1635_Fig2-1-14_ProcessFlowDiagram_v2.dwg

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MOUNT HOPE PROJECT

Process Flow Diagram
Figure 2.1.14

2.1.5 Ore Processing Facilities

The process components at the mill would consist of the following: crushing and ore storage; stockpile reclaim and grinding, flotation and regrind; Mo concentrates dewatering; concentrate leaching; concentrate roasting; TMO packaging; FeMo alloy production and packaging; and reagent use and storage.

Molybdenite would be recovered from the ore using conventional concentration methods. The nominal throughput rate would be 60,500 tpd. Actual processing rates may be lower or higher based on ore hardness and realized equipment efficiencies. The primary crusher and conveyors would be designed to handle a maximum of 114,000 tpd. The stockpile feeders and grinding circuit would be designed to handle a maximum of 86,400 tpd. Figure 2.1.8 shows the conceptual plant layout.

The milling operations would include conventional crushing, wet grinding, and rougher flotation, using a standard reagent scheme for mineral recovery. Thickeners and filters would dewater concentrates to produce a filter cake for further processing in a roaster. The Mo circuit would produce a concentrate with a Mo content of approximately 55 percent at a projected Mo recovery of 82 to 88 percent depending on mill feed grade and **mineral characteristics**. Mo concentrate with impurity levels that would be outside of customer specifications would be leached by a ferric chloride process to reduce the impurity concentrations to the specified levels. Mo concentrate with low levels of impurities may be sent directly to the roaster without leaching. Figure 2.1.14 presents a schematic of the process flow.

Dried Mo concentrate would be processed in a multi-hearth roaster with a maximum throughput capacity of approximately 50 million pounds of Mo metal contained in TMO per year. Up to 50 percent of TMO produced could be converted to FeMo alloy using a metallothermic process.

EML proposes to toll roast (the practice of processing another party's concentrate at another facility for a specified price) Mo concentrates produced by other mines to productively utilize the full capacity of the roaster at a rate of approximately seven 22-ton capacity highway trucks per day. Toll concentrates would be stored in the Concentrator Filter Building prior to processing (Figure 2.1.8). If the toll concentrates require pre-treatment prior to roasting to remove impurities, these concentrates would be directed to the ferric chloride leach circuit as shown in Figure 2.1.14.

2.1.5.1 Crushing and Ore Grinding

Run-of-mine ore would be delivered to the primary crusher station by haul trucks. Under normal operations the trucks would discharge directly into the crusher dump pocket hopper. When the crusher is not operational, trucks would unload ore onto a temporary ore stockpile **in the pit or immediately** adjacent to the crusher station with a capacity for several days of ore processing.

The primary crusher station would be a conventional fixed structure with a dump pocket hopper positioned directly above the gyratory crusher. A hydraulically operated pedestal mounted rock breaker would be installed at the dump pocket. The dump pocket hopper would be designed to be capable of receiving ore simultaneously from two haul trucks. Primary crushed ore would be

Materials that have greater than 0.3 weight percent total S are classified as PAG and materials that have less than 0.3 weight percent total S are classified as Non-PAG.

The criteria are outlined in Table 2.1-4.

Table 2.1-4: Mount Hope Waste Rock[1] Classification System

Total Sulfur	Waste Classification
S > 0.3%	PAG
S ≤ 0.3%	Non-PAG

[1] Waste Rock = rock with less than 0.034 percent Mo

Total S can be quickly estimated in the on-site laboratory by analysis in a LECO manufactured analyzer. The results from the on-site laboratory would be used to classify waste rock according to the criteria summarized in Table 2.1-4.

2.1.3.2.2 On-Site Waste Rock Segregation

Blast hole cuttings would be collected for the LECO process at the on-site laboratory. One sample would be collected from each blast hole. If justified by data collected during operations, a reduction in sampling frequency could be proposed. These data would be used to define the waste type per the criteria summarized in Table 2.1-4. Waste types would be routed directly from the open pit to the appropriate WRDF.

As mining continues and the ore/waste model is refined, the model prediction of the sulfide content could be used along with selective laboratory analysis to route waste rock. **The method of routing waste rock by using selective laboratory analysis and model predictions would be augmented with visual inspection of waste rock to further verify sulfide content, and comparison of model results with previously mined benches to confirm the accuracy of the predictive model. Authorization from the BLM and BMRR would be obtained prior to implementing this alternative waste segregation method.**

2.1.4 Low-Grade Ore Stockpile

The LGO would be mined during pre-stripping through Year 32 and stockpiled for subsequent processing in Years 32 through 44. Approximately 263 million tons of LGO would be placed in a series of lifts to the east of the open pit as shown on Figure 2.1.9. The LGO Stockpile would generally be constructed in multiple lifts with typical heights of 100 feet and setbacks between lifts.

The LGO Stockpile would be constructed on a compacted base in the same manner as the PAG WRDF and would have similar storm water and drainage management systems installed. The material in this stockpile could be processed periodically throughout the mining operation or after mining operations have ceased. At closure, the LGO Stockpile area would be completely cleared of low-grade material and then reclaimed.

- Waste rock deposition procedures to minimize potential oxidation and solute generation; and
- Reclamation and closure activities planned for the WRDFs, as discussed in Section 2.1.16.9.

The WRMP incorporates Acid Base Accounting (ABA) and solute generation information with general waste rock volumes and types in order to optimize the development of WRDFs and minimize the potential for constituent release, while supporting final closure actions.

The WRMP would be updated and modified as needed to integrate data from ongoing geochemical studies, mine modeling changes, mine planning, WRDF performance monitoring, or other information. The proposed mining operations, and thus the WRDF construction, are estimated to last 32 years.

2.1.3.2.1 Waste Rock Classification

The criteria used in the classification of materials for use in waste rock management need to be sufficiently sensitive to the indicators of metal leaching and acid generation as defined by the characterization program, but simple enough for operational waste management. The geochemical characterization study, which is included in the Plan (EML 2006, Appendix 5), has shown that there is a relative lack of carbonate and the primary control on metal leaching and acid generation for the Mount Hope material types is the concentration of sulfide minerals, which can be quantified by the measurement of total sulfur (S). This parameter is also the most sensitive of the geochemical characteristics evaluated during the characterization program and provides the most reliable prediction of acid generation potential. Consequently, total S has been selected as the main diagnostic indicator of metal leaching and **acid-generating potential** (AGP) associated with the Mount Hope waste rock material types.

The BLM guidelines (IM No. NV-2008-32 and NV-2010-014) consider waste rock to be Non-PAG without additional kinetic testing if there is 300 percent excess neutralizing capacity (i.e., Neutralization Potential Ratio [NPR] greater than 3).

Results of the Mount Hope static and kinetic tests demonstrate that waste rock materials with greater than 0.5 weight percent total S are acid generating and materials with less than 0.3 weight percent total S are non-acid generating. Waste rock materials with total S values between 0.3 and 0.5 weight percent demonstrate variable geochemical behavior. However, waste rock materials that fall within this range of total S content (i.e., between 0.3 and 0.5 weight percentage) only comprise a small portion of the total waste rock (i.e., less than one percent based on the current mine plan) and would therefore be conservatively classified as PAG material for the purposes of waste rock classification and management.

Based on site-specific static and kinetic test work, the materials at Mount Hope can be segregated into two waste rock management classes:

- Non-PAG; and
- PAG.

second (cm/sec) and a five-foot thick overlying Non-PAG layer for the foundation. Foundation drains consisting of appropriately sized pipe would be installed within natural drainages of the WRDF foundation to collect precipitation infiltrating through the waste rock and direct it laterally along the foundation to a collection channel located at the east toe. The collection channel would report to a lined pond. Storm water controls would be constructed as discussed in Section 2.1.7.4.

2.1.3.1.2 Non-Potentially Acid Generating Waste Rock Disposal Facility Design

No restrictions would be imposed on the handling and placement of Non-PAG material, some of which may be used as fill for constructing roads or mine facilities or for reclamation purposes elsewhere. The remainder of this material would be placed on the Non-PAG WRDF, south and west of the open pit.

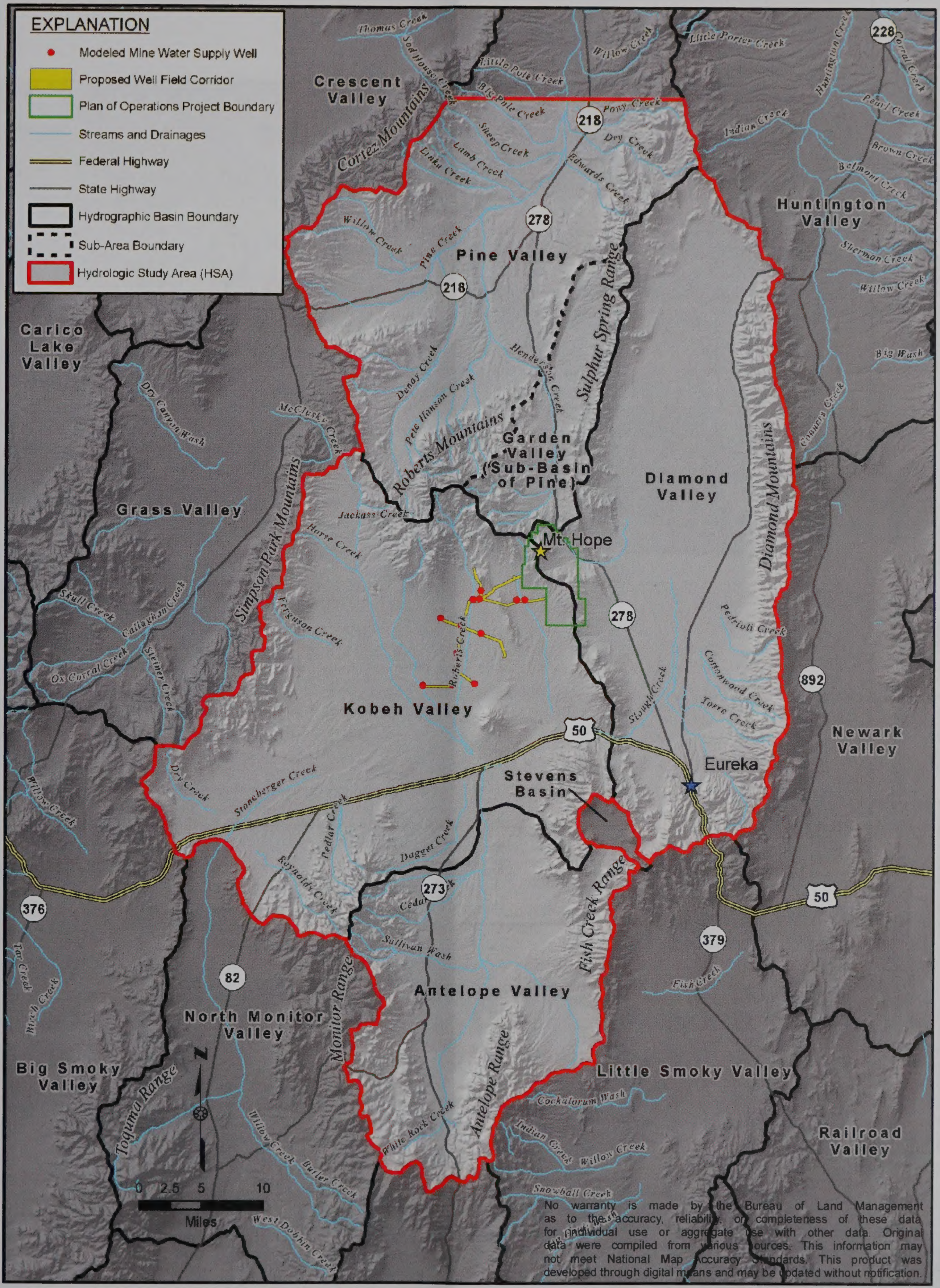
The foundation of the Non-PAG WRDF would be prepared by clearing and grubbing to remove trees, shrubs, vegetation, and salvageable growth media. **Slash from large trees, shrubs, and roots that are encountered during growth media salvage operations would be mechanically separated from growth media as feasible. This slash material would be stockpiled separately from the growth media where it may be burned, used by the public as fire wood, used in final reclamation as habitat enhancements, or hauled off-site to an approved landfill.** The material would be placed directly on the cleared surface with no additional foundation preparation. A sub-drain would be constructed at the location of a spring (SP-7 shown on Figure 2.1.13) by installing a foundation drain. The spring water would then be conveyed to the perimeter of the facility and into a natural drainage. Storm water controls would be constructed as discussed in Section 2.1.7.4.

2.1.3.2 Waste Rock Management

EML has developed a WRMP, which is incorporated into the Plan (EML 2006, Appendix 4) and is summarized in this section of the Proposed Action, to characterize and predict the potential geochemical reactivity and stability of waste rock from the Project operations. The characterization addresses mineralogy, bulk geochemical characteristics, and potential of the material to generate acid or net neutral drainage. Based on the characterization, the WRMP also outlines a waste rock classification system to be used for the management of waste during WRDFs construction.

The WRMP documents the procedures for characterizing, classifying, and managing waste rock associated with the Project for surface waste rock disposal. A complete description of the waste rock characterization program and the results are provided in SRK Consulting, Inc.'s (SRK's) WRMP (2007a). Specifically, the WRMP includes the following:

- Characterization of waste rock according to geochemical testing;
- Characterization of the nature and volume of waste rock to be produced according to the current long range mine plan;
- Classification of the waste rock according to operational criteria for waste rock management;


EXPLANATION
● Modeled Mine Water Supply Well
Proposed Well Field Corridor
Plan of Operations Project Boundary
Streams and Drainages
Federal Highway
State Highway
Hydrographic Basin Boundary
Sub-Area Boundary
Hydrologic Study Area (HSA)
Crescent Valley
Cortez Mountains
Pine Valley
Carico Lake Valley
Huntington Valley
Sulphur Spring Range
Roberts Mountains
Garden Valley (Sub-Basin of Pine)
Diamond Valley
Diamond Mountains
Grass Valley
Simpson Park Mountains
Mt. Hope
Kobeh Valley
Newark Valley
Eureka
Stevens Basin
Fish Creek Range
Antelope Valley
Monitor Range
North Monitor Valley
Big Smoky Valley
Toquima Range
Antelope Range
Little Smoky Valley
Railroad Valley
Thomas Creek
Sod House Creek
Little Pole Creek
Big Pole Creek
Willow Creek
Little Porter Creek
Huntington Creek
Corral Creek
Pony Creek
Sheep Creek
Dry Creek
Lamb Creek
Linka Creek
Edwards Creek
Indian Creek
Pearl Creek
Brown Creek
Belmont Creek
Sherman Creek
Pine Creek
Henderson Creek
Denay Creek
Pete Hanson Creek
Big Wash
Conners Creek
McClusky Creek
Dry Canyon Wash
Jackass Creek
Horse Creek
Ferguson Creek
Roberts Creek
Skull Creek
Callaghan Creek
Ox Corral Creek
Steiner Creek
Pedroli Creek
Cottonwood Creek
Torre Creek
Slough Creek
Stoneberger Creek
Pedlar Creek
Dagget Creek
Reynolds Creek
Cedar Creek
Sullivan Wash
Fish Creek
Tar Creek
Birch Creek
Cockalorum Wash
Indian Creek
Willow Creek
White Rock Creek
Butler Creek
Snowball Creek
West Dobbin Creek
228
218
278
50
892
376
273
379
82
N
0 2.5 5 10
Miles

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MOUNT HOPE PROJECT

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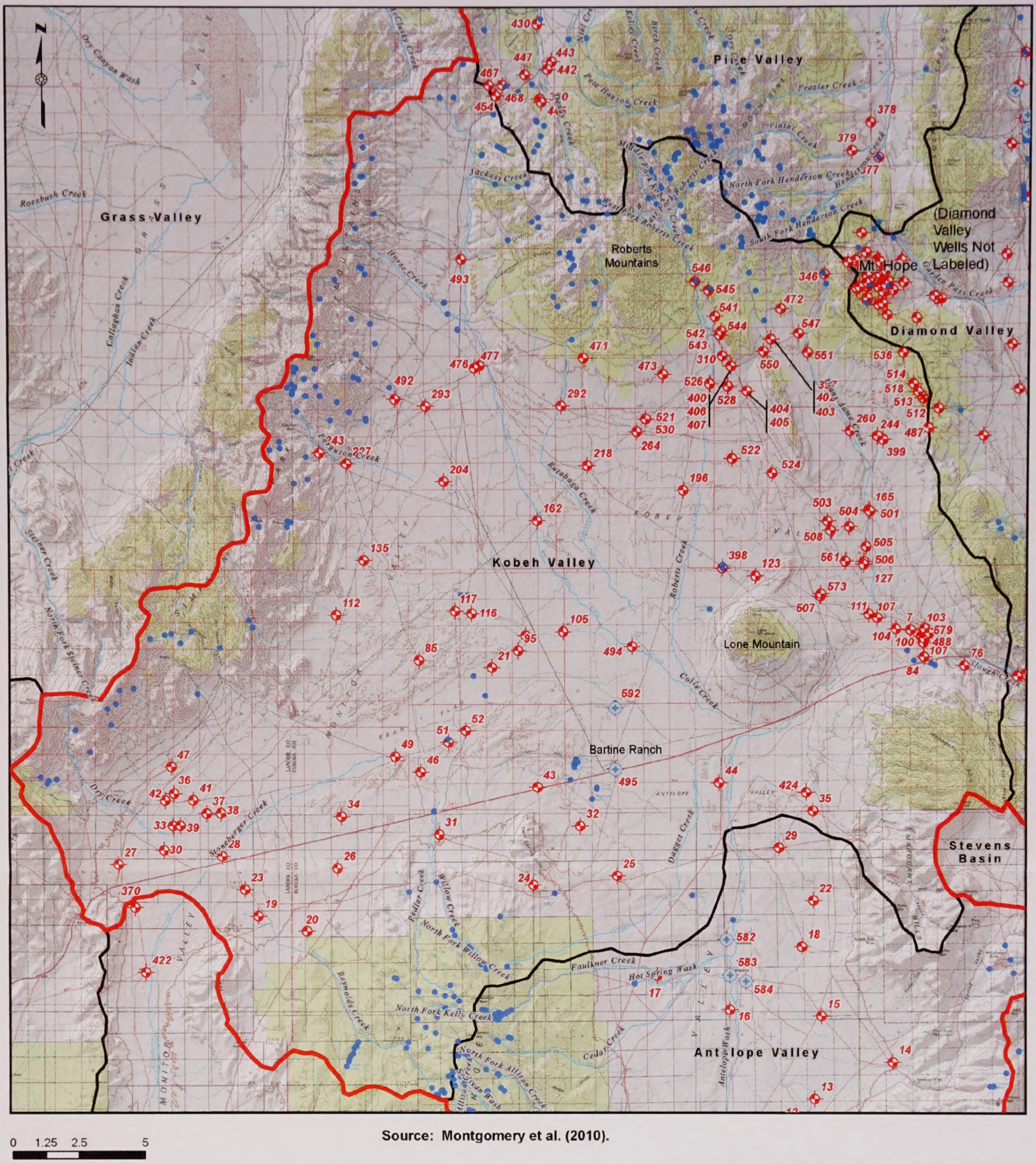
Hydrologic Study Area (HSA) for the Water Resources Analysis

Figure 3.2.1


N
Grass Valley
Kobeh Valley
Pine Valley
Diamond Valley
(Diamond Valley Wells Not Labeled)
Mt. Hope
Roberts Mountains
Lone Mountain
Bartine Ranch
Antelope Valley
Stevens Basin
Dry Canyon Wash
Rosebush Creek
Callaghan Creek
Indian Creek
Steiner Creek
North Fork Steiner Creek
Dry Creek
Stoneberger Creek
Ferguson Creek
Horse Creek
Jackass Creek
Pete Hanson Creek
Frazier Creek
Vinini Creek
North Fork Henderson Creek
South Fork Henderson Creek
Henderson Creek
Gardner Pass Creek
Rutabaga Creek
Roberts Creek
Coils Creek
Slough Creek
Willow Creek
North Fork Willow Creek
Pedlar Creek
Reynolds Creek
North Fork Kelly Creek
North Fork Allison Creek
Faulkner Creek
Hot Spring Wash
Cedar Creek
Antelope Wash
Daggett Creek
Monitor Valley
0 1.25 2.5 5
Miles

Source: Montgomery et al. (2010).

EXPLANATION

- ● Springs
- Wells (Number is Database ID, as listed in Montgomery et al. (2010) Appendix G)
- Flowing Wells (Wells reported to have artesian flow at the time they were initially drilled.)
- ☆ Mt. Hope
- Streams and Drainages
- ☐ Hydrographic Basin Boundary
- ☐ Hydrologic Study Area Boundary

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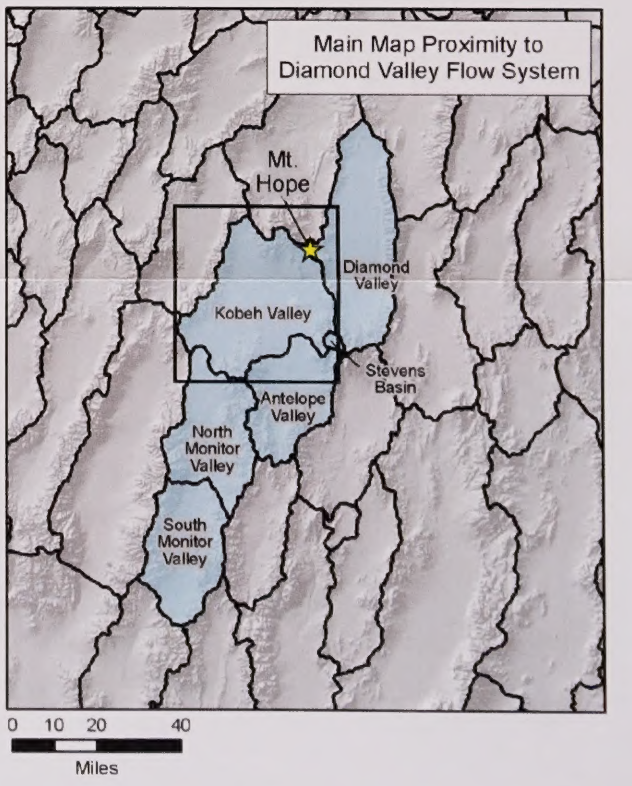
Main Map Proximity to Diamond Valley Flow System
Mt. Hope
Diamond Valley
Kobeh Valley
Stevens Basin
Antelope Valley
North Monitor Valley
South Monitor Valley
0 10 20 40
Miles

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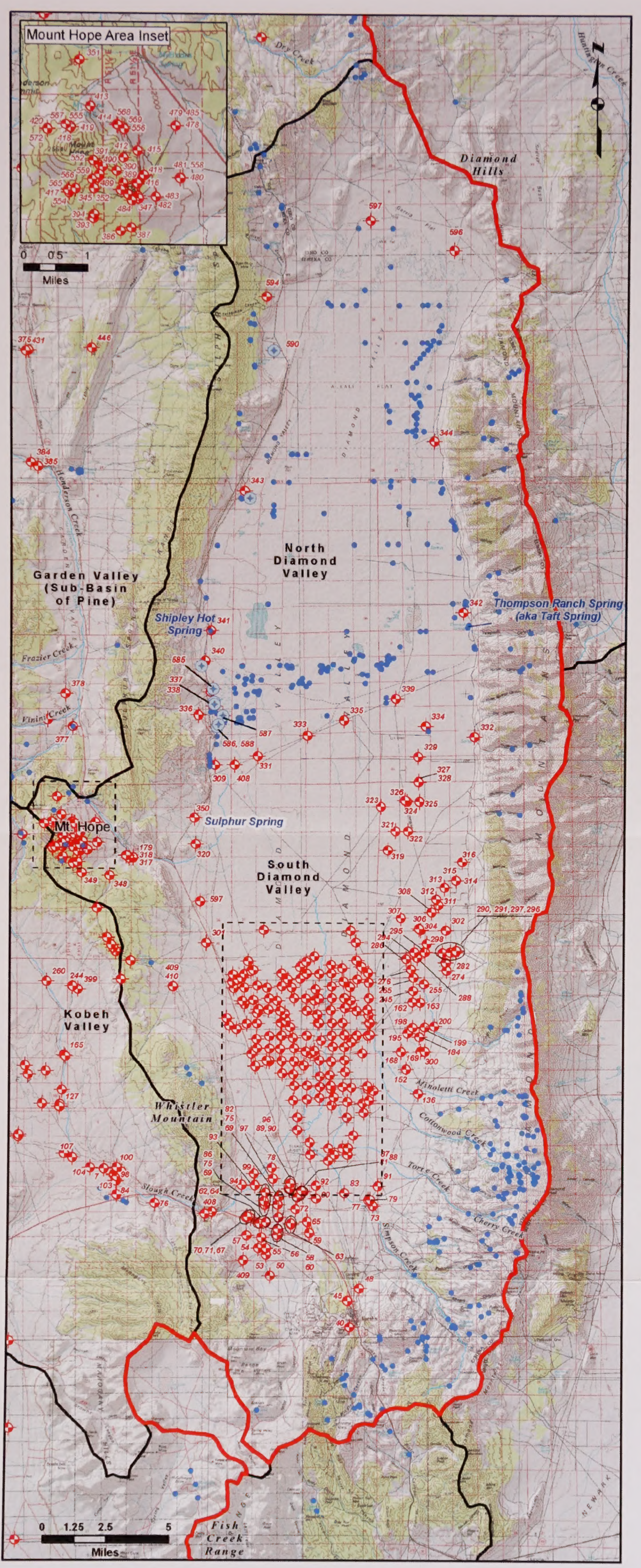
BUREAU OF LAND MANAGEMENT

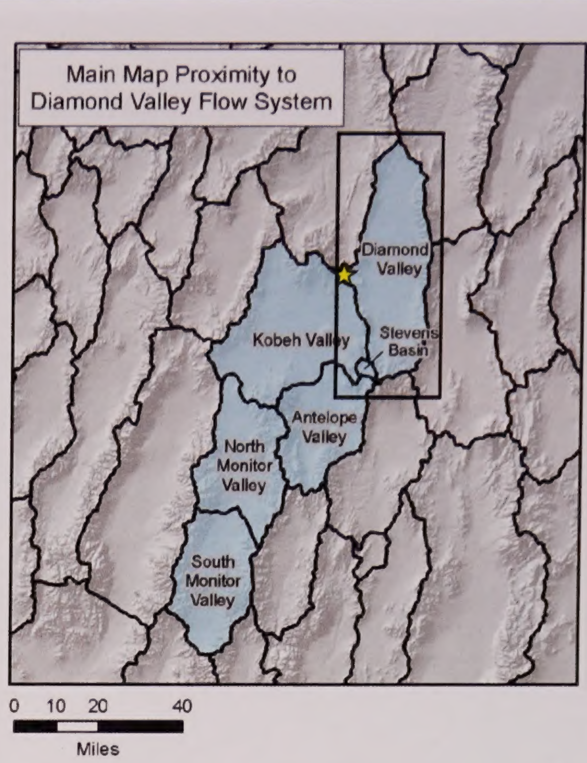
MOUNT HOPE PROJECT

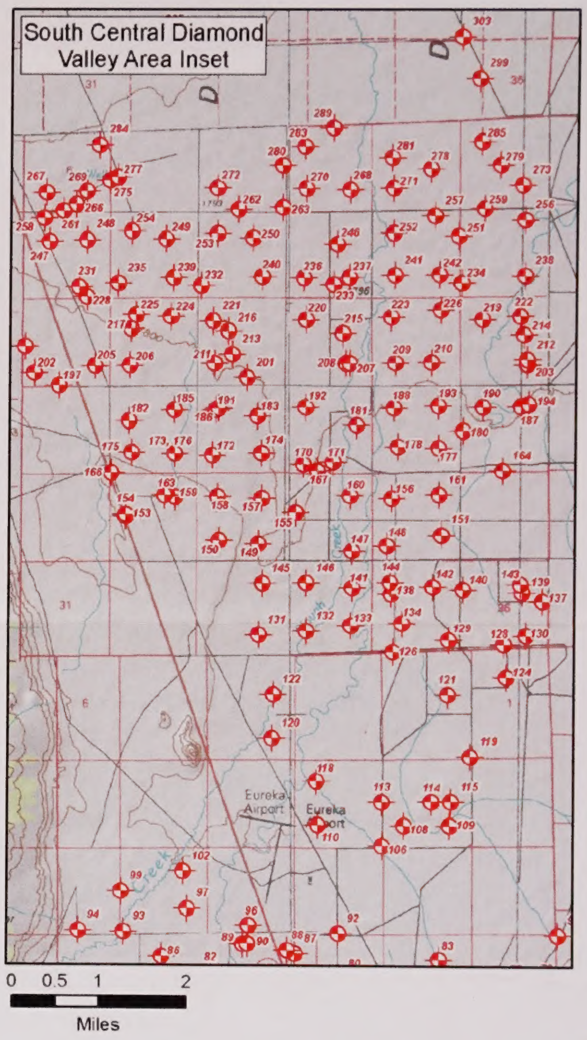
DRAWING TITLE:

Basin Detail of Kobeh Valley

Figure 3.2.2


Mount Hope Area Inset
0 0.5 1
Miles
Diamond Hills
Dry Creek
Huntington Creek
North Diamond Valley
Garden Valley (Sub-Basin of Pine)
Shipley Hot Spring
Thompson Ranch Spring (aka Taft Spring)
Sulphur Spring
Mt. Hope
South Diamond Valley
Kobeh Valley
Whistler Mountain
Henderson Creek
Frazier Creek
Vinini Creek
Slough Creek
Cottonwood Creek
Torre Creek
Cherry Creek
Simpson Creek
Fish Creek Range
0 1.25 2.5 5
Miles


Main Map Proximity to Diamond Valley Flow System
Diamond Valley
Kobeh Valley
Stevens Basin
Antelope Valley
North Monitor Valley
South Monitor Valley
0 10 20 40
Miles


South Central Diamond Valley Area Inset
Eureka Airport
0 0.5 1 2
Miles

EXPLANATION

- ● Springs
- ✛ 41 Wells (Number is Database ID, as listed in Montgomery et al. (2010) Appendix G)
- ⊕ 7 Flowing Wells (Wells reported to have artesian flow at the time they were initially drilled.)
- ☆ Mt. Hope
- Streams and Drainages
- ☐ Hydrographic Basin Boundary
- ☐ Hydrologic Study Area Boundary

Source: Montgomery et al. (2010).

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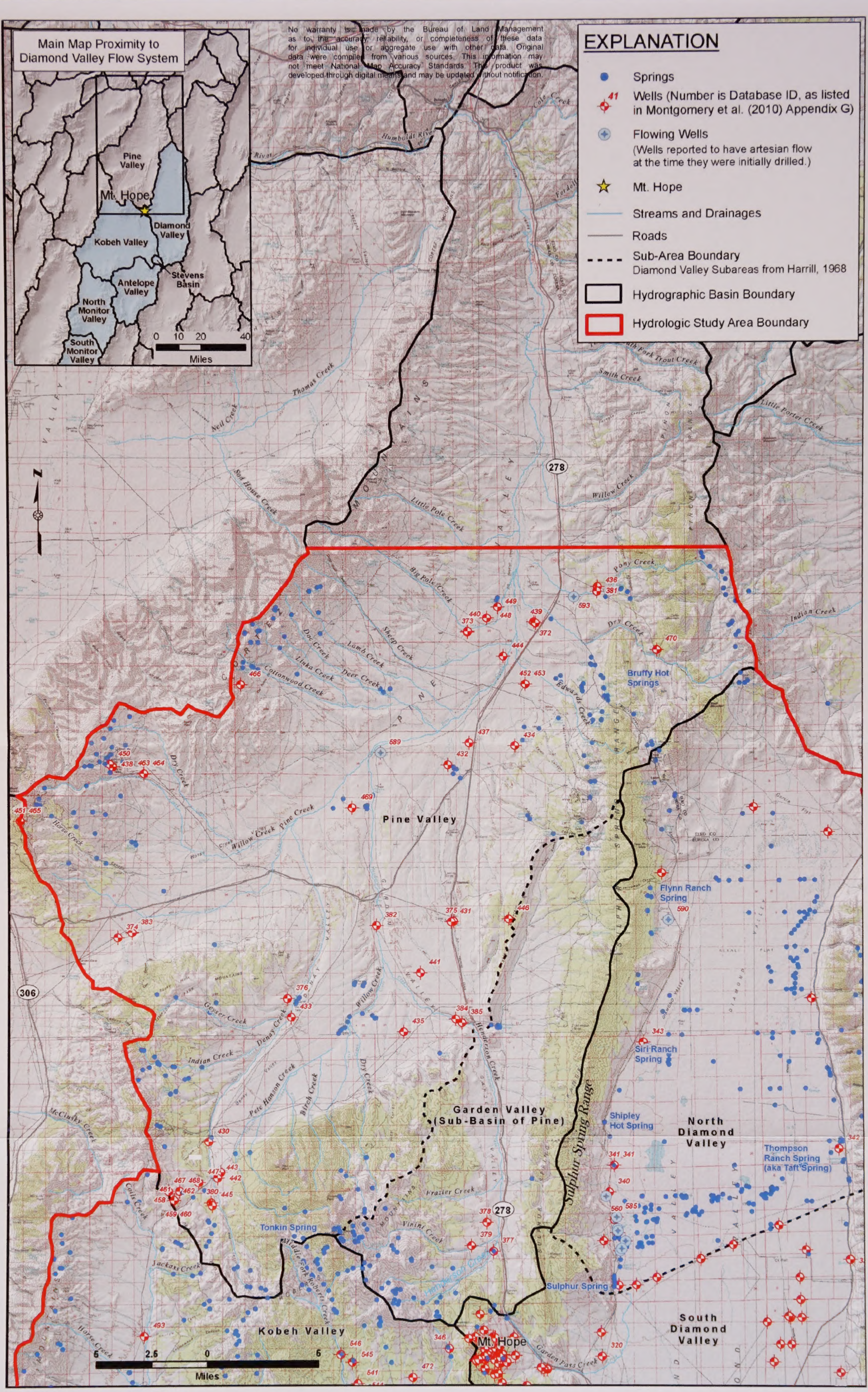
BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Basin Detail of Diamond Valley

Figure 3.2.3


Main Map Proximity to Diamond Valley Flow System
Pine Valley
Mt. Hope
Diamond Valley
Kobeh Valley
Stevens Basin
Antelope Valley
North Monitor Valley
South Monitor Valley
0 10 20 40
Miles
EXPLANATION
Springs
41
Wells (Number is Database ID, as listed in Montgomery et al. (2010) Appendix G)
Flowing Wells
(Wells reported to have artesian flow at the time they were initially drilled.)
Mt. Hope
Streams and Drainages
Roads
Sub-Area Boundary
Diamond Valley Subareas from Harrill, 1968
Hydrographic Basin Boundary
Hydrologic Study Area Boundary
N
Pine Valley
Garden Valley (Sub-Basin of Pine)
North Diamond Valley
South Diamond Valley
Kobeh Valley
Mt. Hope
Sulphur Spring Range
Bruffy Hot Springs
Flynn Ranch Spring
Siri Ranch Spring
Shipley Hot Spring
Thompson Ranch Spring (aka Taft Spring)
Tonkin Spring
Sulphur Spring
Humboldt River
Thomas Creek
Neil Creek
Sod House Creek
Little Pole Creek
Big Pole Creek
Pony Creek
Indian Creek
Smith Creek
Little Porter Creek
Willow Creek
Dry Creek
Doc Creek
Lamb Creek
Sheep Creek
Linka Creek
Deer Creek
Cottonwood Creek
Edwards Creek
Willow Creek
Pine Creek
Horse Creek
Geyser Creek
Denay Creek
Indian Creek
Pete Hanson Creek
Birch Creek
Dry Creek
Henderson Creek
McClusky Creek
Frazier Creek
Vinini Creek
Jackass Creek
Garden Pass Creek
278
306
5 2.5 0 5
Miles

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Source: Montgomery et al. (2010)

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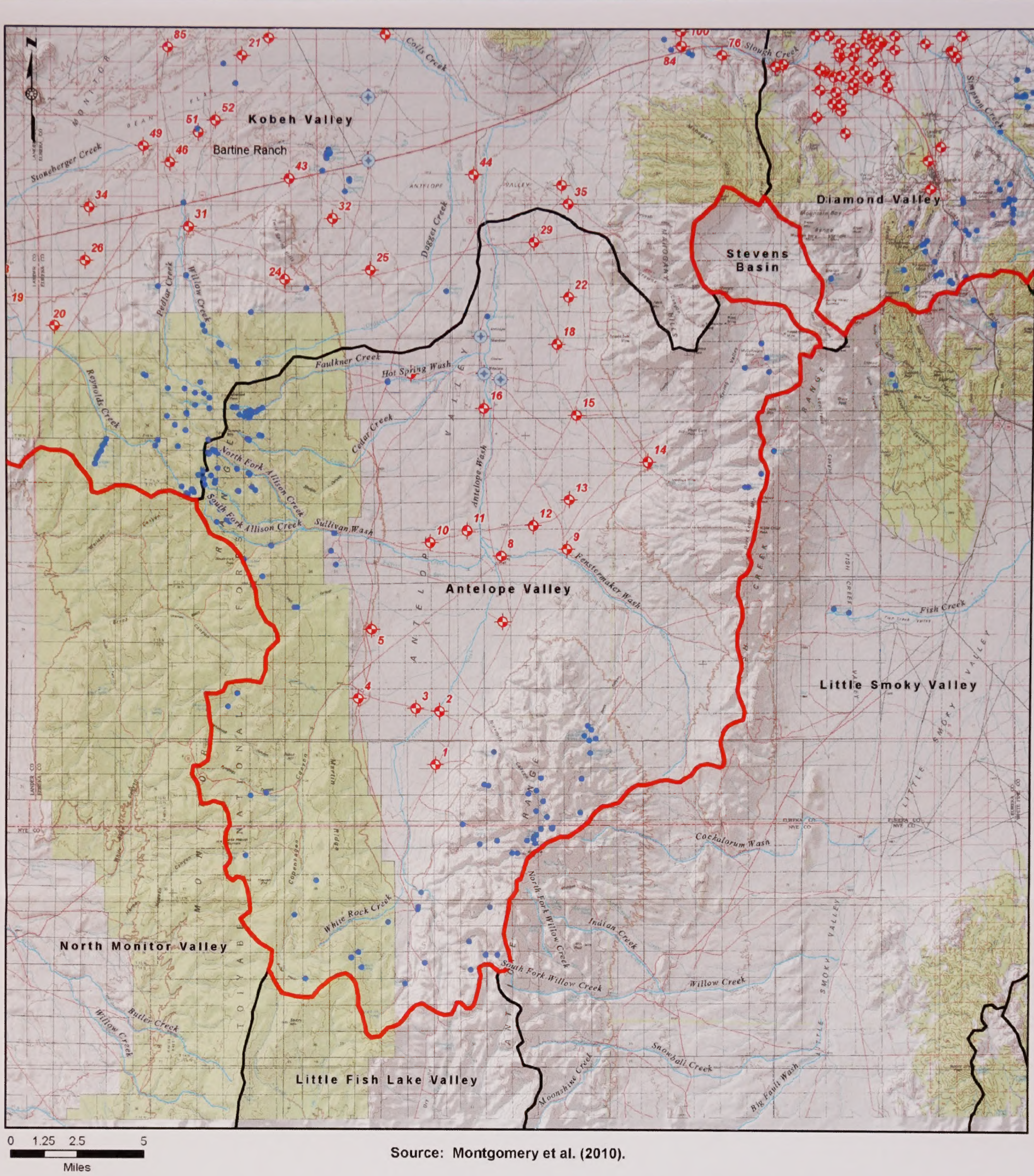
MOUNT HOPE PROJECT

DRAWING TITLE:

Basin Detail of the Southern Part of Pine Valley

Figure 3.2.4


N
Kobeh Valley
Bartine Ranch
Diamond Valley
Stevens Basin
Antelope Valley
Little Smoky Valley
North Monitor Valley
Little Fish Lake Valley
Colls Creek
Slough Creek
Simpson Creek
Stoneberger Creek
Dagget Creek
Willow Creek
Bartine Creek
Faulkner Creek
Hot Spring Wash
Reynolds Creek
North Fork Allison Creek
South Fork Allison Creek
Sullivan Wash
Cedar Creek
Antelope Wash
Fenstermaker Wash
Fish Creek
Cockalorum Wash
White Rock Creek
Indian Creek
North Fork Willow Creek
South Fork Willow Creek
Willow Creek
Snowball Creek
Moonshine Creek
Big Louis Wash
Butler Creek
Willow Creek
0 1.25 2.5 5
Miles

Source: Montgomery et al. (2010).

EXPLANATION

● Springs

41 Wells (Number is Database ID, as listed in Montgomery et al. (2010) Appendix G)

Flowing Wells
(Wells reported to have artesian flow at the time they were initially drilled.)

☆ Mt. Hope

Streams and Drainages

☐ Hydrographic Basin Boundary

🟥 Hydrologic Study Area Boundary

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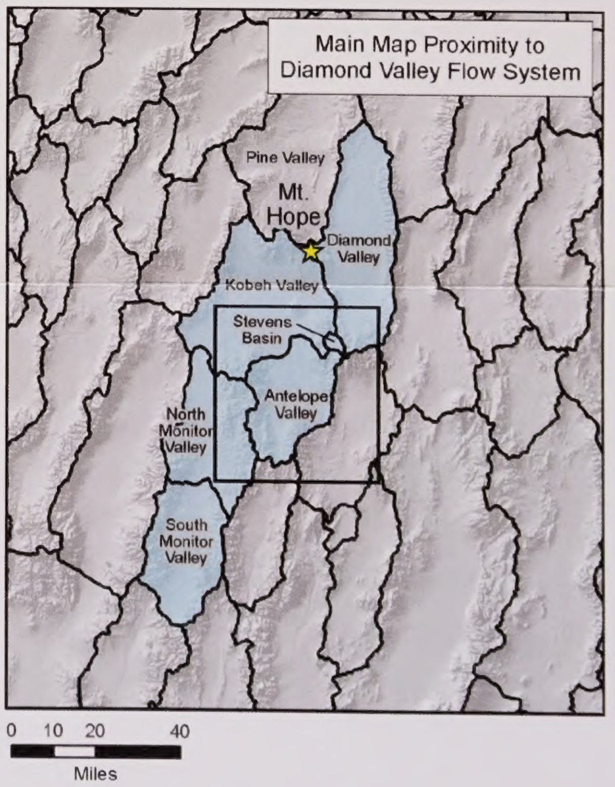
Main Map Proximity to Diamond Valley Flow System
Pine Valley
Mt. Hope
Diamond Valley
Kobeh Valley
Stevens Basin
Antelope Valley
North Monitor Valley
South Monitor Valley
0 10 20 40
Miles

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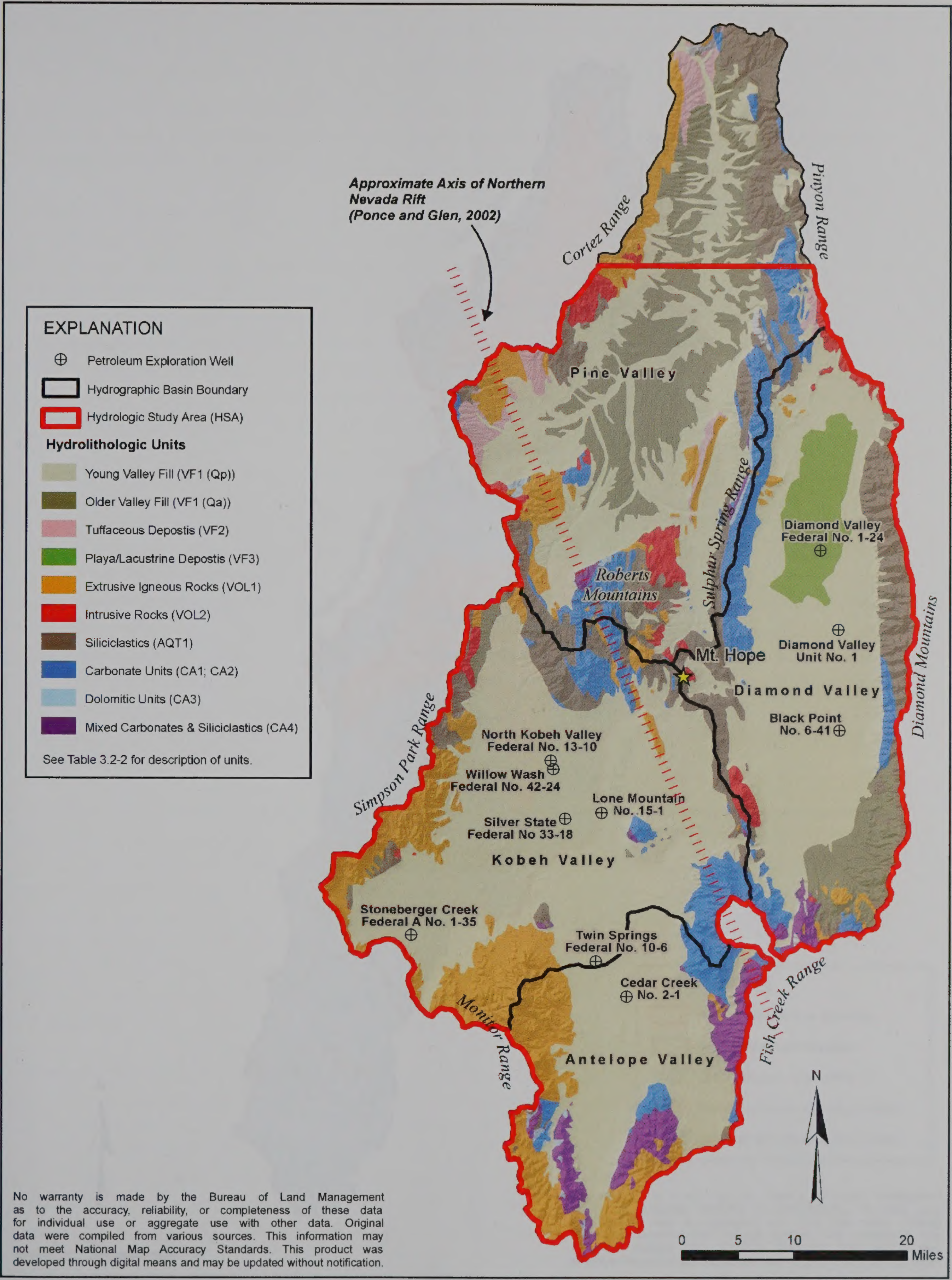
Basin Detail of Antelope Valley

Figure 3.2.5


Approximate Axis of Northern Nevada Rift (Ponce and Glen, 2002)
EXPLANATION
⊕ Petroleum Exploration Well
Hydrographic Basin Boundary
Hydrologic Study Area (HSA)
Hydrolithologic Units
Young Valley Fill (VF1 (Qp))
Older Valley Fill (VF1 (Qa))
Tuffaceous Depostis (VF2)
Playa/Lacustrine Depostis (VF3)
Extrusive Igneous Rocks (VOL1)
Intrusive Rocks (VOL2)
Siliciclastics (AQT1)
Carbonate Units (CA1; CA2)
Dolomitic Units (CA3)
Mixed Carbonates & Siliciclastics (CA4)
See Table 3.2-2 for description of units.
Cortez Range
Pinyon Range
Pine Valley
Sulphur Spring Range
Roberts Mountains
Diamond Valley Federal No. 1-24
Diamond Valley Unit No. 1
Mt. Hope
Diamond Valley
Diamond Mountains
Black Point No. 6-41
Simpson Park Range
North Kobeh Valley Federal No. 13-10
Willow Wash Federal No. 42-24
Lone Mountain No. 15-1
Silver State Federal No 33-18
Kobeh Valley
Stoneberger Creek Federal A No. 1-35
Twin Springs Federal No. 10-6
Cedar Creek No. 2-1
Fish Creek Range
Monitor Range
Antelope Valley
N
0
5
10
20
Miles

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MOUNT HOPE PROJECT

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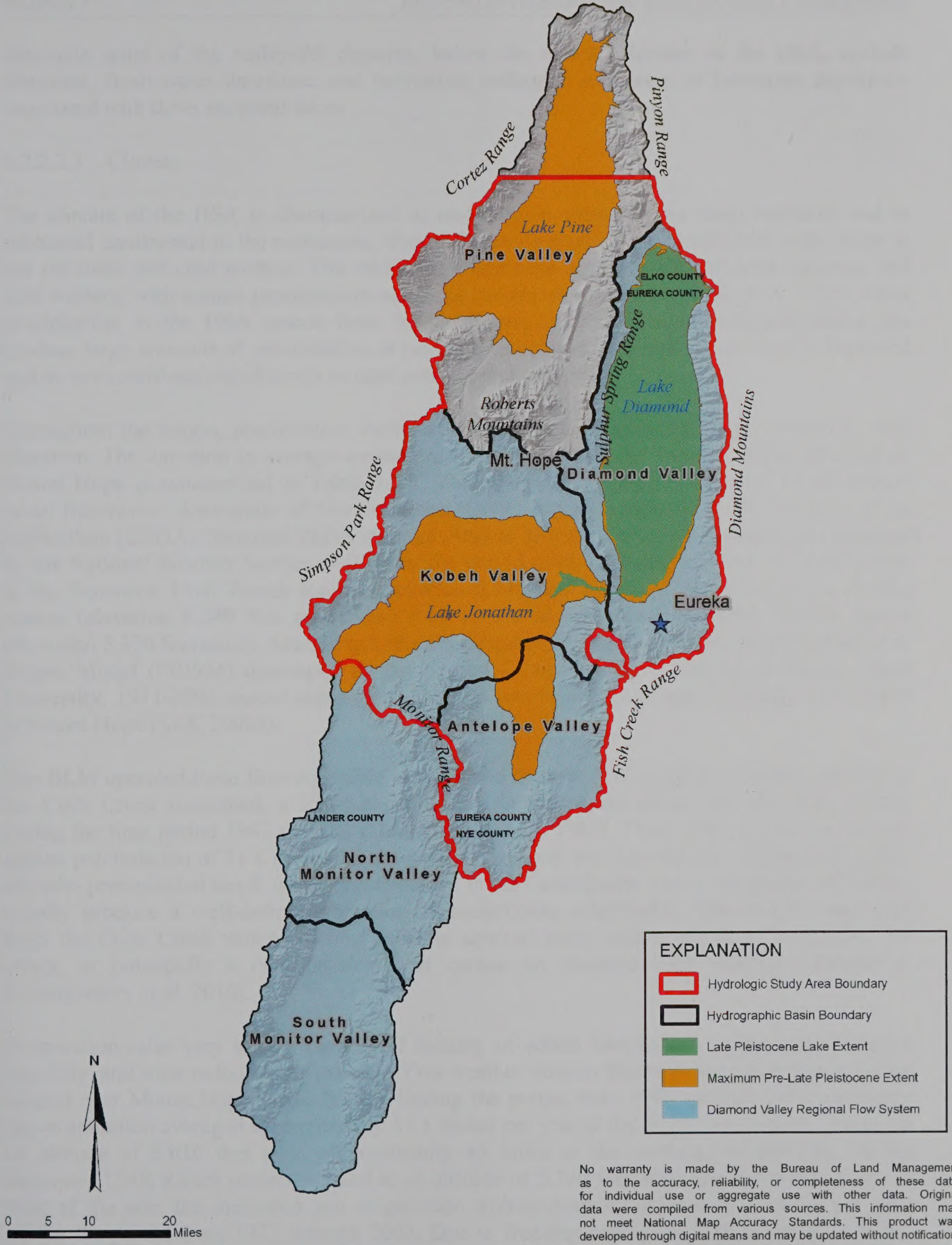
Generalized Hydrogeologic Map of the HSA

Figure 3.2.6


Cortez Range
Pinyon Range
Lake Pine
Pine Valley
ELKO COUNTY
EUREKA COUNTY
Sulphur Spring Range
Lake Diamond
Diamond Mountains
Roberts Mountains
Mt. Hope
Diamond Valley
Simpson Park Range
Kobeh Valley
Lake Jonathan
Eureka
Fish Creek Range
Monitor Range
Antelope Valley
LANDER COUNTY
EUREKA COUNTY
NYE COUNTY
North Monitor Valley
South Monitor Valley
N
0
5
10
20
Miles
EXPLANATION
Hydrologic Study Area Boundary
Hydrographic Basin Boundary
Late Pleistocene Lake Extent
Maximum Pre-Late Pleistocene Extent
Diamond Valley Regional Flow System

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MOUNT HOPE PROJECT

DRAWING TITLE:

Extent of Pleistocene Lakes within the Hydrographic Basins that are Part of the HSA

Figure 3.2.7

lithologic units of the valley-fill deposits, below the recent alluvium in the HSA, include claystone, fresh water limestone, and tuffaceous sediments indicative of lacustrine deposition associated with these ancestral lakes.

3.2.2.2.3 Climate

The climate of the HSA is characterized as mid-latitude steppe in the basin lowlands and as subhumid continental in the mountains. The mid-latitude steppe zone is semiarid, with warm to hot summers and cold winters. The subhumid continental zone has cool to mild summers and cold winters, with annual precipitation occurring mostly as snow (Houghton et al. 1975). Most precipitation in the HSA comes from winter storms. Although summer thunderstorms can produce large amounts of precipitation as rain in a short time, their effects are usually localized and do not contribute significantly to total annual precipitation.

Throughout the region, precipitation varies widely between seasons and years, as well as with elevation. The variation in average annual precipitation for weather stations within 60 miles of Mount Hope is summarized in Table 3.2-1. Three stations are within 25 miles of the Project Area: Beowawe – University of Nevada, Reno (UNR) Ranch; Eureka; and U.S. Department of Agriculture (USDA) Diamond Valley stations. Annual 30-year normal precipitation as computed by the National Weather Service (NWS) for the period from 1971 through 2000 is 11.04 inches at the Beowawe UNR Ranch station (elevation 5,740 feet amsl), 12.06 inches at the Eureka station (elevation 6,540 feet amsl), and 9.14 inches at the Diamond Valley USDA station (elevation 5,970 feet amsl). According to the Precipitation Elevation Regressions on Independent Slopes Model (PRISM) developed by the Spatial Climate Analysis Service at Oregon State University, 1971-2000 annual normal precipitation was estimated at approximately 13.6 inches at Mount Hope (SRK 2008a).

The BLM operated three flow-recording stations and 20 bulk precipitation-collection stations in the Coils Creek watershed, a 50-square mile area in the northwestern part of Kobeh Valley, during the time period 1963 to 1980 (Houng-Ming et al. 1983). Those data showed an average annual precipitation of 11.4 inches for the period of record, but they did not demonstrate a clear altitude- precipitation trend, which is uncommon in the Great Basin, where orographic lift effects usually produce a well-defined elevation-to-precipitation relationship. The precipitation data from the Coils Creek watershed may indicate unusual storm tracks, a lack of orographic lift effect, or potentially a data problem that cannot be resolved with existing information. (Montgomery et al. 2010).

Evaporation rates vary with a number of factors, of which temperature, wind speed, relative humidity, and solar radiation are primary. Two weather stations that measure pan evaporation are located near Mount Hope (SRK 2008a). During the period from 1948 through 2002, measured pan evaporation averaged approximately 51.5 inches per year at the Ruby Lake station, located at an altitude of 6,010 feet amsl approximately 46 miles to the northeast of the site. At the Beowawe UNR Ranch station, located at an altitude of 5,740 feet amsl approximately 23 miles west of the site, the measured pan evaporation averaged approximately 51.2 inches per year during the period from 1972 through 2002. Due to freezing conditions, pan evaporation is not measured in the winter months, November through March, at either station. With a typical pan coefficient of 0.7 applied to these measurements, the mean annual evaporation from an open-water surface would be approximately 36 inches. However, this calculation probably underestimates the actual annual open-water evaporation rate because some evaporation does occur during the winter months and is unaccounted for in the available data sets. Average annual ET, which includes the effects of vegetation, the ground surface, and other factors, may differ substantially from this estimate, as discussed in Section 3.2.2.6.5.

Table 3.2-1: Mean Annual Precipitation at Weather Stations within 60 Miles of the Project Area

Station Name	Approximate Distance and Direction From Project Center	Approximate Elevation (feet amsl)	WRCC Period of Record Mean Annual Precipitation[1] (inches)	NWS 30-Year Normal Annual Precipitation[2] (inches)
Austin	51 miles southwest	6,600	13.02	14.33
Beowawe	58 miles northwest	4,700	8.69	8.84
Beowawe UNR Ranch	23 miles west	5,740	10.63	11.04
Diamond Range SNOTEL[3]	**25 miles east**	**8,000**	**-**	**21.71**
Diamond Valley USDA	10 miles southeast	5,970	9.14	9.14
Eureka	21 miles southeast	6,540	12.02	12.06
Fish Creek Ranch	37 miles southeast	6,050	4.82	-
Jiggs	54 miles northeast	5,420	11.09	-
Jiggs Zaga	50 miles northeast	5,800	14.28	13.35
Pine Valley Bailey	45 miles north	5,050	10.57	10.24
Ruby Lake	46 miles northeast	6,010	12.93	13.66
Snowball Ranch	51 miles south	7,160	9.02	8.81

[1] Western Regional Climate Center (WRCC). Source: Jeton et al. (2006)
[2] NWS 30-year normals for 1971 to 2000. Source: Jeton et al. (2006)
[3] **28-year record from WY1984 to WY2011.**

Most of the annual runoff within and through the HSA is derived from snowmelt. A large percentage of the annual precipitation falls as snow and is stored as snow pack in the higher elevations during the winter months. In the spring months, typically April through June, water from snowmelt produces runoff, which often results in the highest annual flows in many of the high mountain drainages. Occasionally, spring season rainfall coincides with the snowmelt runoff, resulting in extremely high runoff flows. The hot, dry weather in mid- to late-summer, with little or no rain and high evaporation rates generally produces the lowest annual flows.

3.2.2.3 Surface Water Resources

As is typical in the Great Basin, the HSA is dominated by mountain block watersheds that drain onto broad alluvial fans and valley bottoms. Perennial, intermittent, and ephemeral stream reaches occur in the bedrock-controlled mountain drainages, and flows typically dissipate into the fans along the valley margins or drain toward playas near the basin centers. Playas have formed in the topographically low areas of Kobeh and Diamond Valleys. The playa in Kobeh Valley is situated just west of Devil's Gate and has a relatively small surface area (note: at the scale of the maps in this section of the EIS, this small area is not shown). The Diamond Valley playa covers a large portion of the northern end of the basin. These playas are where ground water is naturally discharged.

The locations of streams and creeks and inventoried spring and seep sites are shown on the maps of the individual basins comprising the HSA (Figures 3.2.2 through 3.2.5). Available information on the streams and creeks within each basin of the HSA is summarized in the following paragraphs, followed by a discussion of the main springs and seeps within the HSA. Available measured flows for some of the major drainages in the HSA from the **United States Geological Survey** (USGS) database are outlined in Table 3.2-2 (Enviroscientists 2011a).

Table 3.2-2: Measured Flows in Some Major Drainages Located in the Hydrologic Study Area

Stream Name	Valley	Period of Measure	Measurements	Average Flow (gpm)
Coils Creek	Kobeh Valley	2/2/11 – 7/6/11	4	4,375
Henderson Creek	Pine Valley	7/27/10 – 6/27/11	7	2,904
Tonkin Springs	Pine Valley	7/26/10 – 6/29/11	16	673
Pete Hanson Creek	Pine Valley	10/18/85 – 6/29/11	17	1,131
Roberts Creek	**Kobeh Valley**	**5/4/11 – 7/6/11**	**4**	**4,367**

3.2.2.3.1 Streams and Creeks

Precipitation and geologic conditions in the HSA are such that perennial stream flow only occurs in a few isolated stream reaches. In general, perennial segments have their source in the mountains and, although they do respond to snow melt and rainfall events, much of their flow is provided by ground water discharge that occurs as spring and seep flow. Stream flows in the HSA primarily occur as intermittent flows from isolated springs, short-term seasonal runoff from snowmelt or winter storms, or as ephemeral flow from intense but infrequent thunderstorms. Ephemeral channels primarily carry runoff from rainfall. Rapid snowmelt may cause runoff in ephemeral channels; however, this occurs only infrequently.

Numerous drainages leave the mountain fronts and cross over alluvial fans where flows from those drainages typically dissipate on the fans. When water does reach the valley floor during larger runoff events, the water is soon taken up by ET and seepage into valley-floor sediments. Clearly defined stream channels tend to be confined to the margins of the basins where slopes are steepest and runoff is greatest during precipitation events. Channels become poorly defined as they near the flatter portion of the basins and runoff infiltrates into permeable alluvial fan material.

Kobeh Valley

In Kobeh Valley, surface drainage is directed generally from the mountains to the central valley floor and then eastward toward Devil's Gate, where flow occasionally passes into Diamond Valley via Slough Creek. Surface water occasionally flows into the southern part of Kobeh Valley via the main ephemeral drainages in Antelope Valley (Antelope Wash) and the northern part of Monitor Valley (Stoneberger Creek). The Stoneberger Creek drainage enters the southwestern side of Kobeh Valley from Monitor Valley and crosses southern Kobeh Valley in a west to east direction through Bean Flat (Figure 3.2.2). Antelope Wash enters Kobeh Valley from the south at a point where several ephemeral drainages join on the southeastern side of Kobeh Valley to form Slough Creek. Slough Creek, also ephemeral, drains east through Devil's Gate into southern Diamond Valley. Channel geomorphology and a lack of vegetation scour indicate that outflow through Devil's Gate is a rare occurrence related to low frequency, high runoff events. Reported flows in Slough Creek in May of 1964, during a peak period of seasonal flow, ranged from approximately 670 to 1,120 gpm (1.5 to 2.5 cubic feet per second [cfs]) (Robinson et al. 1967).

The two main internal drainages within Kobeh Valley are Coils Creek in the western part of the valley, which drains the east side of the Simpson Park Mountains and the western side of the Roberts Mountains, and Roberts Creek, which drains the central and southeastern part of the Roberts Mountains (Figure 3.2.2). Rutabaga Creek lies between these two drainages and drains the southern part of the Roberts Mountains.

Roberts Creek is identified as being perennial from the headwaters of its middle and east fork tributaries to near the mountain front (BLM 1997). A segment of the Cottonwood Canyon drainage, on the southwest side of the Roberts Mountains, is also identified as containing perennial flow upstream of its confluence with the Coils Creek drainage. The only other identified perennial stream reaches in Kobeh Valley are Snow Water Canyon and Ferguson Creek on the east side of the Simpson Park Mountains, as well as Ackerman Creek, Basin Creek, Coils Creek, Dry Canyon, Dry Creek, Kelly Creek, Jackass Creek, and Meadow Canyon. A small segment of U'ans-in-dame Creek to the east-northeast of Lone Mountain is also classified by the BLM (1997) as perennial. However, based on 2010 field observations and a review of Landsat images and the USDA's National Agricultural Imaging Program (NAIP) aerial photography, it is now believed that this stream segment is not perennial (Montgomery et al. 2010).

Stream discharge measurements were taken by Interflow along the course of Roberts Creek in 2007. Measurements made during August 2007 on the tributaries of Roberts Creek indicated that most of the flow originated from the east fork, at 108 gpm (0.24 cfs), which received its flow from springs along the west and south to southeast flanks of the Roberts Mountains. The west and middle forks of Roberts Creek contributed little flow at that time, with the west fork being dry, and the middle fork discharge estimated at 4.5 gpm (0.01 cfs) (Montgomery et al. 2010). Measured discharge below the confluence of the three forks of Roberts Creek consistently decreased with distance downstream, indicating that Roberts Creek is a losing stream over most of its length. These stream losses are assumed to result in recharge to the local alluvial and carbonate aquifer systems. Flow loss due to evaporation and transpiration from riparian vegetation adjacent to the stream bed may also be a contributing factor to the consistent downstream decrease in flow.

Coils Creek is interpreted by Rush and Everett (1964) to be the principal tributary to Slough Creek. They reported a flow of approximately 3,600 gpm (eight cfs) in May 1964 at a location in Section 27, T22N, R49E (near the locations of wells #476 and #477, shown on Figure 3.2.2). Intermittent reaches of upper Coils Creek are mainly fed by spring flow and are used for irrigation purposes. More recent estimates of intermittent flows in Coils Creek have not been found.

In August 2007, Interflow measured a flow of nine gpm (0.02 cfs) in Rutabaga Creek on the southern flanks of the Roberts Mountains (Montgomery et al. 2010). Along the east slope of the Simpson Park Mountains, on the west side of Kobeh Valley, Interflow observed the following: no surface flow in Snow Water Canyon during both June and December 2007 and also in April 2008; no flow in Ackerman Canyon in April and a flow of 27 gpm (0.06 cfs) in May of 2008; an estimated flow of less than 112 gpm (0.25 cfs) in Ferguson Creek in May and no flow in August 2007; and no flow in Dry Canyon in June 2007. At the stream gage on Roberts Creek, Interflow measured flows of 561 and 1,872 gpm (1.25 and 4.17 cfs) in April and May 2008, respectively.

Reported flows in Willow Creek and Dagget Creek, which drain the north end of the Monitor Range in southern Kobeh Valley, were approximately 450 and 670 gpm (one and 1.5 cfs), respectively, in May 1964 (Robinson et al. 1967). No other drainages within the Kobeh Valley basin have recorded stream flows.

Antelope Valley

A limited number of perennial stream segments have been identified in Antelope Valley (Figure 3.2.8). In April and May 1964, flows of approximately 450 and 900 gpm (one and two cfs) were observed in Alison Creek and Copenhagen Canyon, respectively, along the east slope of the Monitor Range on the west side of Antelope Valley; also, a flow of approximately 670 gpm (1.5 cfs) was measured in Ninemile Creek on the eastern side of Antelope Valley in May of 1964 (Robinson et al. 1967). Interflow estimated a flow of less than 112 gpm (0.25 cfs) in Alison Creek in June of 2007 (Montgomery et al. 2010).

Pine Valley

The main streams in Pine Valley are in the Horse Creek, Denay Creek, Henderson Creek, and Pine Creek drainages. Pine Creek is the principal stream in the valley and is a tributary to the Humboldt River. Eakin (1961) reported that the flow in Pine Creek is maintained primarily by the discharge from hot springs in the northwest quarter of Section 12, T28N, R52E, which are located near the northern boundary of the HSA.

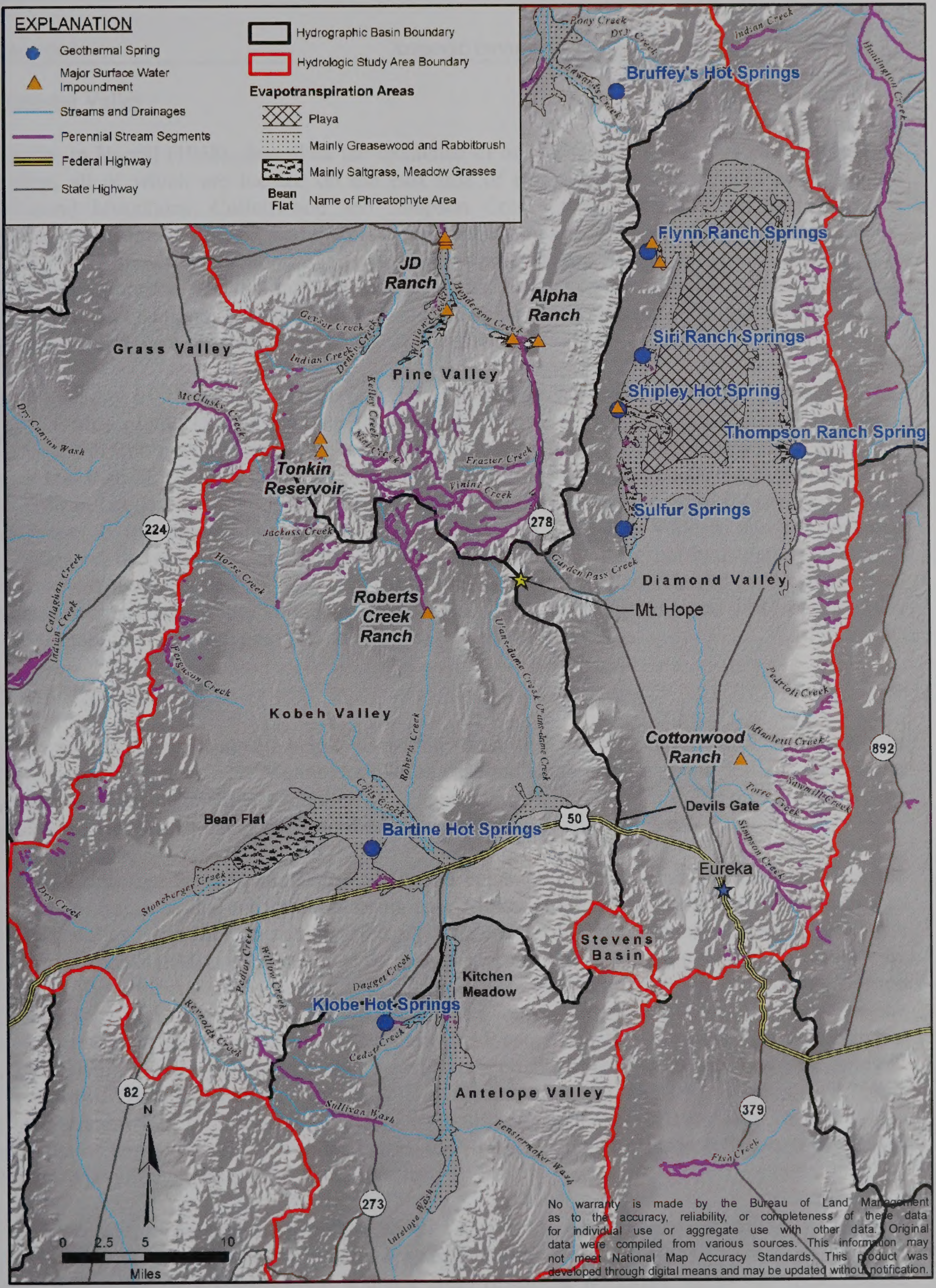
In the Pine Valley portion of the HSA, numerous headwater tributaries to Pine Creek form on the east and southeast-facing slopes of the Cortez Mountains (Horse Creek drainage) and the northern part of the Simpson Park Mountains (Denay Creek drainage), on the north to northwest flanks of the Roberts Mountains (Pete Hanson Creek, Neil Creek, Kelly Creek, Birch Creek, Willow Creek, and Dry Creek), and on the northeast side of the Roberts Mountains in the Garden Valley subbasin (Henderson Creek, Vinini Creek, and Frazier Creek). Perennial stream-flow segments have only been identified on portions of Denay Creek, Pete Hanson Creek, Willow Creek, Vinini Creek, and Henderson Creek (BLM 1997).

Isolated reaches in the Horse Creek drainage of Pine Valley were reported to have flows ranging from nine to 58 gpm (0.02 to 0.13 cfs) during August 2005 before surface flows were lost to infiltration or ET (BLM 2008b). The Denay Creek drainage arises from headwater springs in Red Canyon on the north slope of the Roberts Mountains, and is fed lower down in the drainage by perennial discharge from Tonkin Spring (discussed in Section 3.2.1.2.2). Denay Creek discharges into Tonkin Springs Reservoir, a small surface-water impoundment, approximately one mile downstream of Tonkin Spring. Between August 2007 and September 2009, Interflow measured the discharge from Tonkin Spring during all months of the year, and the range of observed flows was from 525 to 1,086 gpm (1.17 to 2.42 cfs) (Montgomery et al. 2010). This provides an estimate of the flows in Denay Creek just downstream of Tonkin Spring. Further east, along the north side of the Roberts Mountains, Interflow reported no flow in Pete Hanson Creek during August 2007 and a flow of 1,023 gpm (2.28 cfs) in June of 2009. Also, Willow Creek was observed to have flows of 31 and nine gpm (0.07 and 0.02 cfs) in August and October 2007, respectively.

As part of the baseline characterization investigations in 2006, SRK (2008a) established three surface water monitoring stations on Henderson Creek, allowing two distinct reaches of the creek to be studied. The upper monitoring station is approximately one-half mile southeast and downgradient of Spring 585 (discussed in Section 3.2.2.3.2) at an elevation of approximately 7,177 feet amsl. SRK reported that the creek flow is perennial at the upper monitoring station, with the flow sustained by discharge from local springs and seeps. The middle monitoring station is approximately two miles downgradient of the upper station and is located approximately 50 feet below the confluence of the north and south forks of Henderson Creek at an elevation of approximately 6,688 feet amsl. The creek flow at this location is also thought to be perennial and fed by springs and seeps in the upper part of the watershed. The stream channel morphology at the middle monitoring station is described as being substantially incised, with arroyo-like features. The lower monitoring station is approximately 2.5 miles downgradient of the middle station and is located roughly 60 feet west of SR 278 at an elevation of approximately 6,446 feet amsl. SRK characterized the lower reach as being perennial, but noted that the actual flowing locations of the creek near the lower monitoring station vary on a seasonal basis, such that the established sampling-point location was observed to be dry in the third and fourth quarters of 2006 and the first quarter of 2007.

During the field investigation site visits in 2006 and 2007, SRK (2008a) recorded maximum flow rates of approximately 400, 3,180, and 2,600 gpm (0.9, 7.1, and 5.8 cfs) at the upper, middle, and lower monitoring stations, respectively, on Henderson Creek in May 2006. Subsequent monitoring events recorded smaller flow rates, ranging from 45 to 112 gpm (0.1 to 0.25 cfs), at the upper and middle monitoring stations and no flow at the lower station. The measured stream-flow data indicate that the reach of Henderson Creek between the upper and middle stations generally gains flow, whereas the reach between the middle and lower stations generally loses flow.

Stream flow measurements were also made by Interflow on Henderson and Vinini Creeks, north of Mount Hope in the Garden Valley subbasin of Pine Valley (Montgomery et al. 2010). During August and October 2007, Vinini Creek was observed to be dry, whereas in May 2008 and June 2009 flows of 3,110 and 950 gpm (6.93 and 2.12 cfs), respectively, were recorded. Henderson Creek was measured in August 2007 at the confluence of its north and south fork tributaries. No stream flow was observed from the north fork at that time, whereas discharge from the south fork was reported to be 27 gpm (0.06 cfs). Other flow measurements in Henderson Creek are 36 gpm (0.08 cfs) in December 2007 and 135 gpm (0.3 cfs) in May of 2008. According to Interflow, Henderson Creek contained observable flow in a reach approximately 2.3 miles long before losing all of its surface flow to infiltration and ET (Montgomery et al. 2010). As shown on Figure 3.2.8, Henderson Creek is also perennial in its lower reaches near the Alpha Ranch.


EXPLANATION
Geothermal Spring
Major Surface Water Impoundment
Streams and Drainages
Perennial Stream Segments
Federal Highway
State Highway
Hydrographic Basin Boundary
Hydrologic Study Area Boundary
Evapotranspiration Areas
Playa
Mainly Greasewood and Rabbitbrush
Mainly Saltgrass, Meadow Grasses
Bean Flat
Name of Phreatophyte Area
Pony Creek
Dry Creek
Indian Creek
Huntington Creek
Edwards Creek
Bruffey's Hot Springs
Flynn Ranch Springs
JD Ranch
Henderson Creek
Alpha Ranch
Geyser Creek
Denay Creek
Willow Creek
Indian Creek
Siri Ranch Springs
Grass Valley
Pine Valley
Shipley Hot Spring
McClusky Creek
Kelly Creek
Nine Mile Creek
Thompson Ranch Spring
Dry Canyon Wash
Tonkin Reservoir
Frazier Creek
Vinini Creek
Sulfur Springs
224
278
Jackass Creek
Garden Pass Creek
Diamond Valley
Horse Creek
Roberts Creek Ranch
Mt. Hope
Callaghan Creek
Indian Creek
Ferguson Creek
Uravs-dume Creek
Pedroli Creek
Kobeh Valley
Roberts Creek
Cottonwood Ranch
Mineletti Creek
892
Coils Creek
Sawmill Creek
Torre Creek
Devils Gate
Bean Flat
50
Bartine Hot Springs
Simpson Creek
Eureka
Stoneberger Creek
Dry Creek
Stevens Basin
Pediar Creek
Willow Creek
Dugget Creek
Kitchen Meadow
Reynolds Creek
Klobe Hot Springs
Cedar Creek
82
Antelope Valley
Sullivan Wash
379
Fenstermaker Wash
Fish Creek
N
273
Antelope Wash
0 2.5 5 10
Miles

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MOUNT HOPE PROJECT

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Geothermal Resources, Perennial Stream Segments, and Major Surface-Water Impoundments within the HSA

Figure 3.2.8

Diamond Valley

Lamke, in Harrill (1968), described the existence of only a few perennial streams in Diamond Valley, all of which are located on the east side of the valley on the western slopes of the Diamond Mountains. Cottonwood and Simpson Creeks were mentioned as the two most prominent perennial streams, and the only ones that supported ranching operations in the 1960s. Figure 3.2.8 shows the location of the perennial stream segment in Diamond Valley. The only intermittent streams in Diamond Valley with a significant volume of seasonal runoff are also located in the Diamond Mountains. The rest of the streams in Diamond Valley are intermittent or ephemeral and were reported to have only minor flows.

Between May of 1965 and October of 1966, reported stream flows in 11 drainages along the western side of the Diamond Mountains ranged from zero flow to a maximum of 785 gpm (1.75 cfs) in Cottonwood Creek on one occasion; all other observed flows during that time period were less than 287 gpm (0.64 cfs) (Harrill 1968). No flow was observed during March and June of 1966 in Garden Pass Creek, an ephemeral creek on the western side of Diamond Valley that originates at the topographic divide between Pine and Diamond Valleys, and an unnamed drainage on the eastern slopes of the Sulphur Spring Range in the northern part of Diamond Valley was also reported to be dry in April and October of 1966 (Harrill 1968). Peak flow measurements made by the USGS in Garden Pass Creek between 1965 and 1981 ranged from 224 to more than 290,000 gpm (0.5 to 650 cfs) (Hydro-Search 1982).

Mount Hope Project Area

There are no perennial stream segments within the Project Area boundary, and the majority of the ephemeral streams near Mount Hope drain east and south into Diamond Valley. The closest perennial stream segment to Mount Hope is approximately three miles to the north, in the upper reaches of Henderson Creek, as described above in the discussion of Pine Valley.

Surficial drainage from Mount Hope occurs via ephemeral streams that radiate away from the mountain. Some of the ephemeral streams near Mount Hope drain to the west and south into Kobeh Valley. A minor, unnamed tributary to Henderson Creek drains a small area on the northwest flank of Mount Hope and is the only surface drainage from the Project Area into Pine Valley. The northern and eastern sides of Mount Hope drain into Garden Pass Creek. Tyrone Creek drains the south side of the mountain and joins Garden Pass Creek southeast of the mountain, just upstream of where Garden Pass Creek cuts through the Sulphur Spring Range and enters Diamond Valley. A short distance east of this erosional gap, the creek disappears into the alluvium of Diamond Valley. Two ephemeral streams drain the western side of Mount Hope. These streams join to become a relatively well-defined channel (U'ans-in-dame Creek), which persists for approximately two miles before the stream channel becomes difficult to discern in the surficial alluvium of eastern Kobeh Valley.

The Zinc Adit, located approximately 0.25 mile east of the current core-shed building, is one of several adits associated with the historical workings of the Mount Hope Mine. Drainage from the Zinc Adit is the only known mine drainage from historical workings within the Project Area. Measurements of flow from the Zinc Adit were made quarterly from October of 2005 through the first quarter of 2007 and were fairly constant throughout the year, ranging from 7.6 to 9.4 gpm (0.017 to 0.021 cfs) (SRK 2008a).

3.2.2.3.2 Springs and Seeps

Springs and seeps are numerous within the HSA, and an inventory has been compiled from various sources, including the USGS National Hydrography Dataset, the Great Basin Center for Geothermal Research (GBCGR) database, field exploration by mine consultants (SRK and Interflow), and spring locations digitized from 1:24,000-scale USGS topographic maps. Interflow has compiled all of the available spring and seep data into a single inventory (spreadsheet file), which lists 1,102 individual sites within the HSA (Montgomery et al. 2010, Appendix E). The locations of inventoried springs and seeps are shown on the maps of the individual basins comprising the HSA (Figures 3.2.2 through 3.2.5) and a large-format composite map showing the location and inventory identifier for each spring and seep is presented in Montgomery et al. (2010, Appendix E).

Many of the springs in the HSA occur along the contacts between rocks of differing hydraulic properties. This condition can result from a variation in lithology or permeability, or be a result of faulting that juxtaposes differing rock units. Many of the springs in the HSA are seasonal in nature, with flow occurring during brief periods of time when ground water levels are temporarily elevated in response to recharge. To varying degrees, the flow of springs in the HSA is regulated by long-term climatic conditions and, in some cases, also by anthropogenic water use. Springs occur primarily in the mountains and along the mountain fronts, although some seeps occur on the valley floors where the depths to ground water are shallow.

Within the Diamond Valley basin, flows from some of the springs and seeps in the southern part of the valley and along the mountain fronts have declined since the mid-1960s, coincident with the observed changes in water levels in the basin-fill aquifer of that valley as discussed in Section 3.2.2.6.4. Outside of Diamond Valley, there have been no reports of generally declining spring and seep flows in any of the other basins in the HSA.

Most of the springs in the HSA that have substantial perennial flow or have some unique historical, cultural, ecological, or aesthetic significance, are described below in the discussion of geothermal springs. Of the numerous cold springs that exist in the HSA, Tonkin Spring (Spring 378) in the Denay Creek drainage of Pine Valley has the largest flows. Between August of 2007 and September of 2009, Interflow measured the discharge from Tonkin Spring during all months of the year (Montgomery et al. 2010). A minimum flow of 525 gpm (1.17 cfs) was observed during March of 2009, and a maximum flow of 1,086 gpm (2.42 cfs) was recorded during August of 2007. Measurements made for three consecutive years (2007, 2008, and 2009) during the month of August ranged between 718 and 1,086 gpm (1.60 and 2.42 cfs), with a mean value of 862 gpm (1.92 cfs). The recorded temperature of the spring is 55.6 ˚F.

Geothermal Springs

Springs with water temperatures elevated above the mean annual surface temperature are affected by heat from geologic materials at depth and are referred to as geothermal springs. The majority of the geothermal springs in the HSA are associated with major range-bounding faults and are thought to involve deep ground water circulation (Montgomery et al. 2010). The most prominent of these geothermal fault zones is the southern portion of the 22-mile long Piñon Range fault, which lies on the east side of Pine Valley along the Sulphur Spring Range. Another fault zone associated with elevated spring temperatures within the HSA is the Western Diamond

Mountain fault zone, which runs along the base of the Diamond Mountains in a north-south orientation for approximately 40 miles. The Antelope Peak Fault System, located along the northern edge of the Monitor Range in Kobeh and Monitor Valleys is likely responsible for the elevated temperatures of waters located at Klobe Hot Springs, the Bartine Ranch area, and the Hot Spring Hill complex.

Brief descriptions of the geothermal springs within the HSA are presented below, with the spring inventory identifier numbers included for reference (Montgomery et al. 2010, Appendix E). The locations of known geothermal resources within the HSA are shown in Figure 3.2.8.

Klobe Hot Springs (also known as Bartholomae Springs, Springs 930 and 931): These springs are located at the northeastern end of the Monitor Range in Antelope Valley. Water temperatures in the flowing springs have been recorded as high as 156 ˚F (Fiero 1968), and were 158 ˚F in a water well installed over the spring complex (Rush and Everett 1964). Mariner et al. (1974) estimated reservoir temperatures of 163 ˚F using a sodium (Na)-potassium-Ca geothermometer technique. Two wells located four miles east of the springs have ground water temperatures of 72 ˚F and 74 ˚F, which were measured by Bartholomae Corporation; this difference in temperature indicates that the influence of the geothermal springs diminishes to the east. Montgomery et al. (2010) report a historical flow measurement of approximately 500 gpm (1.11 cfs) during April of 1964 at Klobe Hot Springs.

Bartine Hot Springs (Springs 816, 820, 824, and 826): These springs are located approximately 2.5 miles north of the Bartine Ranch along U.S. Highway 50 in Kobeh Valley. They are near the west side of Lone Mountain and are 11 miles north of, and along the same fault zone as, Klobe Hot Springs. Montgomery et al. (2010) report that two of the springs (824 and 826) emanate from a large travertine deposit (tufa mound), with an average water temperature of 106 ˚F and a discharge of approximately two to three gpm (0.004 to 0.007 cfs). The tufa-mound is locally referred to as "Hot Spring Hill".

Bruffey's Hot Springs (Springs 74 through 79): These springs are located on the west side of the Sulphur Spring Range in Pine Valley, along the Piñon Range fault. Large calcareous sinter terraces containing barite and fluorite have accumulated around multiple spring discharge points (White 1955). Montgomery et al. (2010) report recorded temperatures as high as 152 ˚F and a flow rate of approximately 50 gpm (0.11 cfs) in June of 2007 for Bruffey's Hot Springs.

Flynn Ranch Springs (Springs 186 and 187): These springs are located along the east side of the Sulphur Spring Range in the northern part of Diamond Valley. They consist of several warm springs discharging into a deep pool. Water temperatures of approximately 70 ˚F and a combined discharge of ten gpm (0.022 cfs) have been reported (Reed et al.1983).

Shipley Hot Spring (Spring 330): This spring is located on the eastern flanks of the Sulphur Spring Range in the northern part of Diamond Valley. Estimated reservoir temperatures of 109 ˚F were determined using silica geothermometers (Mariner et al. 1983). As summarized by Montgomery et al. (2010), historical discharge measurements at Shipley Spring recorded between April of 1965 and January of 1991 ranged from 2,303 to 3,707 gpm (5.13 to 8.26 cfs). More recent discharge measurements made in 2008 and 2009 by SRK and Interflow recorded flows in the range of 935 to 1,600 gpm (2.08 to 3.56 cfs) (Montgomery et al. 2010).

Siri Ranch Springs (Springs 285 and 288): The Siri Ranch Springs are located on the eastern flanks of the Sulphur Spring Range in the northern part of Diamond Valley, approximately 4.5 miles north of Shipley Hot Spring. The reported temperature for the springs is 85 ˚F, and a nearby ranch well is reported to have a water temperature of approximately 95 ˚F (Reed et al. 1983). Mifflin (1968) reported a discharge of approximately 290 gpm (0.65 cfs) from the Siri Ranch Springs.

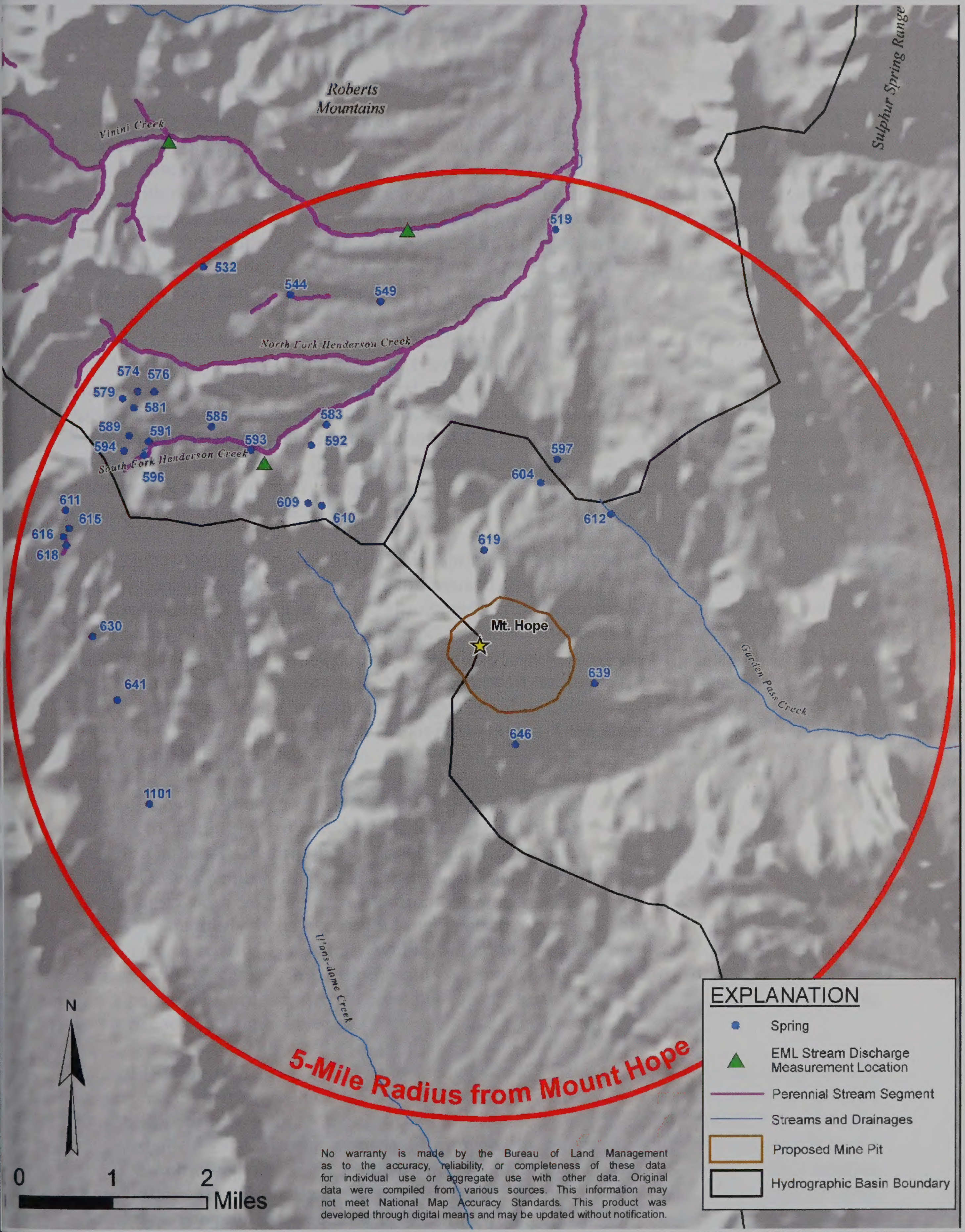
Sulfur Springs (Springs 560, 562, 564, 567, and 570): These springs are located along the eastern flanks of the Sulphur Spring Range in central Diamond Valley, approximately eight miles south of Shipley Hot Spring. These warm springs were reported to have a temperature of 74 ˚F and a discharge of 40 gpm (0.09 cfs) in November of 1965 (Harrill 1968). SRK observed no flow from Sulfur Springs during a field inspection in 2007 (SRK 2008c).

Thompson Ranch Spring (also known as Taft Spring, Spring 362): This spring is located on the east side of Diamond Valley along the western flanks of the Diamond Mountains and is reportedly associated with the Western Diamond Range fault zone (Harrill 1968). The recorded temperatures of the spring ranges from 69 to 75 ˚F (Mifflin 1968). Historical discharge measurements at Thompson Ranch Spring during the 1965 through 1990 time period ranged from 18 to 1,900 gpm (0.04 to 4.23 cfs). Montgomery et al. (2010) reported that the spring ceased flowing around 1990.

Mount Hope Area Springs and Seeps

SRK (2008a) inventoried the land area within approximately five miles of Mount Hope in September and October of 2005 and reported seven springs within the Project Area boundary and 13 springs outside of the Project Area boundary but within the five-mile radius. Brief descriptions of those inventoried springs are presented below along with the corresponding spring inventory identifier numbers (Montgomery et al. 2010, Appendix E). Subsequent field investigations by SRK (2008c) and spring database review by Interflow (Montgomery et al. 2010) identified 16 additional spring and seep locations with a five-mile radius of Mount Hope. Detailed descriptions of these additional springs and seeps are unavailable, but they were included in the overall inventory of springs and seeps within the HSA as Springs 519, 532, 544, 549, 576, 580, 583, 589, 591, 593, 594, 611, 616, 618, 638, and 639. In total, there are 31 inventoried springs and seeps within a five-mile radius of Mount Hope, as shown on Figure 3.2.9.

McBrides Spring (Spring 612): This spring is located approximately 150 feet east of SR 278, between Garden Pass and the Mount Hope road turnoff at an elevation of about 6,389 feet amsl. Within the riparian corridor of the spring there was no surface expression of water and the soil was dry to a depth of approximately 18 inches when visited by SRK. A pipe buried beneath the riparian area collects water and conveys it to a cattle trough approximately one mile south of the riparian area. A discharge of 1.8 gpm was recorded in October of 2006; during other quarterly visits the spring was dry. The site consists of a very small riparian area of approximately 200 feet square, containing Mexican rush (*Juncus mexicanus*), Kentucky bluegrass (*Poa pratensis*), and various forbs species surrounded by dense Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and rubber rabbitbrush (*Ericameria nauseosus*).


Roberts Mountains
Sulphur Spring Range
Vinini Creek
North Fork Henderson Creek
South Fork Henderson Creek
Garden Pass Creek
Ufans-dame Creek
Mt. Hope
519
532
544
549
574
576
579
581
585
583
589
591
593
592
594
596
597
604
611
615
609
610
612
616
618
619
630
639
641
646
1101
5-Mile Radius from Mount Hope
N
0
1
2
Miles
EXPLANATION
● Spring
EML Stream Discharge Measurement Location
Perennial Stream Segment
Streams and Drainages
Proposed Mine Pit
Hydrographic Basin Boundary

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

DESIGN: EMLLC	DRAWN: GSL	REVIEWED: RFD
CHECKED: -	APPROVED: RFD	DATE: 07/28/2011
FILE NAME: p1635_Fig3-2-X_Hydro_8i11i.mxd		

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Surface Water Resources within Five Miles of Mount Hope

Figure 3.2.9

Garden Spring (Spring 597): This spring is located approximately 1.5 miles northwest of SR 278 at an elevation of approximately 6,468 feet amsl. The Garden Spring site consists of two separate points of discharge within the same general area; both were reported to be perennial water features with no visible outlet for surface water. Water that emanates from the spring collects in local depressions. Flow measurements for the spring have not been obtained because there is no discrete flow from either point of discharge. The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, Great Basin wild rye (*Elymus cinereus*), and Nebraska sedge (*Carex nebraskensis*).

Unnamed (Spring 604): This spring is located approximately 1,500 feet south of Garden Spring and 1.5 miles west of SR 278 between Garden Pass and the Mount Hope road turnoff at an elevation of approximately 6,400 feet amsl. The site consists of a permanent pond with no visible inlet or outlet for surface water flow. Since the site has been monitored, no flow measurements have been obtained from the spring, although the pond has been observed to contain varying amounts of water released from an upgradient artesian well, IGM-152, which is located approximately one mile from the spring site. The site is dominated by rubber rabbitbrush, with an understory of Great Basin wild rye.

Mount Hope Spring (Spring 619): This spring is located west of the preceding spring (Spring 604) and SR 278 between Garden Pass and the Mount Hope road turnoff at an elevation of approximately 7,175 feet amsl. The site consists of a buried steel pipe that daylights out of the hillside under a tree and runs above ground for about 30 feet to a cattle trough. The pipe is a permanent source of water for a partially buried cattle trough, which fully captures the inflow of water. The rate of inflow to the trough has been observed to vary by season, with a maximum recorded discharge of approximately 0.3 gpm in May 2006. The site vegetation community consists primarily of singleleaf piñon (*Pinus monophylla*), Utah juniper (*Juniperus osteosperma*), and Wyoming big sagebrush.

Unnamed, next to monitoring well IGM-154 (Spring 631): This spring is located in close proximity to monitoring well IGM-154, and is approximately five miles southeast of SR 278 along the Garden Pass dirt road at an elevation of approximately 6,923 feet amsl. The site consists of a small gully with riparian vegetation that conveys water downgradient into two stock ponds, with no visible outflow of water from the stock ponds. This site was dry or frozen during all of SRK's quarterly visits except for August of 2006, when a flow of two gpm was recorded. The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, Great Basin wild rye, and various unidentified forbs species. The site has a riparian area of approximately 200 square feet surrounded by dense Wyoming big sagebrush, and rubber rabbitbrush.

Unnamed (Spring 637): This spring is located one-half mile south of monitoring well IGM-154 and the preceding spring (Spring 631), and is approximately five miles southeast of SR 278 along the Garden Pass two-track dirt road at an elevation of approximately 7,001 feet amsl. The site consists of a small riparian corridor surrounded by piñon and juniper. Discharge from the spring was observed to be intermittent during SRK's quarterly site visits; when present, measured flows ranged from approximately 0.8 to 8.6 gpm (in March of 2007 and May of 2006, respectively). The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, Great Basin wild rye, and various forbs species. The site is surrounded by an upland dominant vegetative community including singleleaf piñon, Utah juniper, and Wyoming big sagebrush.

Unnamed (Spring 646): This spring is located south of the Mount Hope Mine office building and core shed, approximately one mile due south of monitoring well IGM-169 at an elevation of approximately 6,819 feet amsl. The site consists of a small (roughly two feet by two feet) depression in the soil that contains one to two feet of standing water. The site appears to be a permanent water feature with a seasonally-fluctuating water level in the depression. SRK was unable to obtain a flow measurement from this spring during the 2005-2007 quarterly site visits. The immediate vicinity of the spring is dominated by Mexican rush. The site is surrounded by singleleaf piñon, and Utah juniper.

Unnamed, Henderson Creek watershed (Spring 585): This spring is located on the southeast side of Roberts Mountains near the south fork of Henderson Creek at an elevation of approximately 7,557 feet amsl. During wet periods, water issues from several points of discharge along a generally straight line, possibly indicating a fault. Flows from these multiple sources are conveyed into a common channel for approximately one-half mile before joining Henderson Creek. A discharge of approximately two gpm was recorded in May of 2006, but no spring flow was observed during SRK's other quarterly visits to the site. The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, Great Basin wild rye, and various forbs species.

Unnamed, Henderson Creek watershed (Spring 592): This spring is located south of the south fork of Henderson Creek at an elevation of approximately 6,953 feet amsl. The spring was reported to be perennial, with seasonal variation in flow. Recorded discharge during SRK's quarterly site visits ranged from less than 0.1 to nine gpm (in August 2006 and May 2006, respectively). The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, Great Basin wild rye, coyote willow (*Salix exigua*), and various forbs species.

Unnamed (Spring 610): This spring is located on the northwest slope of Henderson Summit near historical mine prospects identified on USGS topographic maps at an elevation of approximately 7,313 feet amsl. SRK reported that the spring is perennial, with seasonal variation in flow. Spring discharge accumulates in a sump that is covered by several logs. From this sump, the water flows approximately 60 feet downgradient into a small stock pond. Recorded discharge during SRK's quarterly site visits ranged from approximately 0.15 to two gpm (in March 2007 and May 2006, respectively). The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, Great Basin wild rye, coyote willow, and various forbs species. Upland dominant vegetation surrounding the spring site includes Wyoming big sagebrush, singleleaf piñon, and Utah juniper.

Unnamed (Spring 606): This spring is located near the preceding spring (Spring 610) on the northwest slope of Henderson Summit at an elevation of approximately 7,203 feet amsl. The spring consists of several points of discharge that converge and then dissipate approximately 75 feet downgradient from the source. A discharge of approximately 0.15 gpm was recorded in May 2006, but no spring flow was observed during SRK's other quarterly visits to the site. The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, coyote willow, and various forbs species. Upland dominant vegetation surrounding the spring site includes Wyoming big sagebrush, singleleaf piñon, and Utah juniper.

Unnamed (Spring 609): This spring is located near the two preceding springs (Springs 610 and 606) on the northwest slope of Henderson Summit at an elevation of approximately 7,334 feet amsl. The spring's flow is intermittent. During wet periods, water issues from several points of discharge and is conveyed approximately 120 feet downgradient in several small, discrete channels before terminating in a small stock pond. Flow measurements have not been collected from the site due to the distributed nature of the discharge points. The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, Great Basin wild rye, coyote willow, aspen trees (*Populus tremuloides*), and various forbs species. Upland dominant vegetation surrounding the spring site includes Wyoming big sagebrush, singleleaf piñon, and Utah juniper.

Unnamed, east of Roberts Creek in Kobeh Valley (Spring 1101): This spring is located in the northeast part of Kobeh Valley in an unnamed drainage approximately two miles west of the Project Area at an elevation of approximately 6,650 feet amsl. The spring site is developed and consists of a seep area with a series of cattle troughs that are fed by a black pipe, which is buried in a small hill behind the troughs. Two small stock ponds are located immediately downgradient of the seep area and troughs, and they collect water from the seep area. No water was observed flowing from the pipe and the cattle troughs were dry during SRK's quarterly site visits, although the area immediately surrounding the cattle troughs showed different degrees of saturation depending on the season. Due to consistently dry conditions, there have been no spring flow measurements at this site. The spring site consists of an unvegetated area disturbed by cattle, surrounded by upland vegetation.

Unnamed, east of Roberts Creek in Kobeh Valley (Spring 641): This spring is located approximately one mile north of the preceding spring (Spring 1101) in an unnamed drainage in the northeast part of Kobeh Valley, approximately 2.5 miles west of the Project Area at an elevation of approximately 6,901 feet amsl. Spring discharge accumulates in a sump and then flows approximately 150 feet downgradient in a single channel that terminates in a series of small stock ponds, with no apparent outlet for flow from the stock pond area. Based on persistent discharge during the quarterly site visits, SRK (2008a) inferred that the spring is perennial, with seasonal variation in flow. Recorded discharge during SRK's quarterly site visits ranged from less than 0.1 to 3.4 gpm (in August and October of 2006, respectively). The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, Great Basin wild rye, stinging nettles (*Urtica dioica*), and Nebraska sedge.

Unnamed, east of Roberts Creek in Kobeh Valley (Spring 630): This spring is located approximately one-half mile north of the preceding spring (Spring 641) in an unnamed drainage in the northeast part of Kobeh Valley, approximately three miles west of the Project Area at an elevation of approximately 7,142 feet amsl. Spring discharge issues from partially weathered limestone bedrock and is conveyed through a small channel approximately 300 feet downgradient before it disperses into a series of small stock ponds. Based on persistent discharge during the quarterly site visits, SRK (2008a) inferred that the spring is perennial, with seasonal variation in flow. Recorded discharge during SRK's quarterly site visits ranged from approximately 0.5 to 13.6 gpm (in March 2007 and May 2006, respectively). The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, Great Basin wild rye, and Nebraska sedge. The site is surrounded by an upland dominant vegetative community including singleleaf piñon, Utah juniper, and Wyoming big sagebrush.

Unnamed, east of Roberts Creek in Kobeh Valley (Spring 615): This spring is located approximately one mile north of the preceding spring (Spring 630) in an unnamed drainage in the northeast part of Kobeh Valley, approximately 3.5 miles west of the Project Area at an elevation of approximately 7,572 feet amsl. The site consists of a series of seeps with many points of discharge. During quarterly site visits, SRK noted that the spring area was **noticeably** impacted by wildlife and cattle. Water from the source area flows approximately 1,500 feet downgradient through approximately 30 acres of meadow area before dissipating in Kobeh Valley. Based on persistent discharge during the quarterly site visits, SRK (2008a) inferred that the spring is perennial, with seasonal variation in flow. However, flow measurements have not been collected from the site due to the distributed nature of the discharge points. The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, Great Basin wild rye, and Nebraska sedge.

Unnamed, upper Henderson Creek watershed (Spring 579): This spring is located in the uppermost headwaters of the Henderson Creek watershed at an elevation of approximately 8,126 feet amsl. The spring's flow is intermittent. During wet periods, water issues from a small depression along a hill slope. A channel conveys flow to a series of low-lying natural depressions and overflow from this area spills into the upper reach of Henderson Creek. A small amount of discharge (less than 0.1 gpm) was recorded in May of 2006, but no spring flow was observed during SRK's other quarterly visits to the site. The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, Nebraska sedge, and wild iris (*Iris missouriensis*).

Unnamed, upper Henderson Creek watershed (Spring 574): This spring is located downgradient of the preceding spring (Spring 579) in the uppermost headwaters of the Henderson Creek watershed at an elevation of approximately 8,025 feet amsl. The spring water issues from a two-inch diameter steel pipe that is buried in the hillside and discharges to the upper reaches of Henderson Creek. Based on persistent discharge during the quarterly site visits, SRK (2008a) inferred that the spring flow is perennial. Recorded discharge during SRK's quarterly site visits ranged from approximately 1.7 to 5.5 gpm (in March of 2007 and August of 2006, respectively). The primary vegetative community within the spring's riparian corridor consists of Kentucky bluegrass, Great Basin wild rye, Nebraska sedge, wild iris, foothills lupine (*Lupinus ammophilus*), and Western Skunk cabbage (*Lysichiton americanus*).

Unnamed, upper Henderson Creek watershed (Spring 596): This spring is located in the second drainage south of, and approximately one-half mile from, Spring 579 in the uppermost headwaters of the Henderson Creek watershed at an elevation of approximately 8,039 feet amsl. Flow at this site issues from several sources within a large meadow, estimated at 100 acres in size. Water that accumulates in the meadow flows into a common channel, which reports to Henderson Creek. SRK (2008a) inferred that the spring is perennial, with seasonal variation in flow. Recorded discharge during SRK's quarterly site visits ranged from approximately 7.5 to 9.5 gpm (in October and August of 2006, respectively). The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, Great Basin wild rye, wild iris, foothills lupine, and Nebraska sedge.

Unnamed, upper Henderson Creek watershed (Spring 581): This spring is located approximately one-half mile south Spring 579 in the uppermost headwaters of the Henderson Creek watershed at an elevation of approximately 8,099 feet amsl. The spring's flow is intermittent. During wet periods, water issues from several points of discharge in a meadow approximately ten acres in size and collects in a single channel that reports to Henderson Creek. A discharge of approximately 23 gpm was recorded in May of 2006, but no spring flow was observed during SRK's other quarterly visits to the site. The primary vegetative community within the spring's riparian corridor consists of Mexican rush, Kentucky bluegrass, Great Basin wild rye, wild iris, foothills lupine, and Nebraska sedge. The site is surrounded by an upland dominant vegetative community that consists primarily of Wyoming big sagebrush.

3.2.2.3.3 Other Surface Water Features

There are no naturally occurring lakes or ponds within the HSA at present. However, several man-made surface-water impoundments exist within the study area and are primarily used for stockwater and irrigation purposes. The locations of surface water impoundments within the HSA are shown in Figure 3.2.8, based on field inspections and a review of USGS 7.5-minute topographic maps and NAIP aerial photography (Montgomery et al. 2010). The identified surface water impoundments that intermittently or perennially contain water include the following: 1) Tonkin Reservoir on upper Denay Creek, JD Ranch reservoirs on lower Henderson Creek and Pete Hanson Creek, and the Alpha Ranch impoundments of Henderson Creek and Chimney Springs in Pine Valley; 2) the Roberts Creek Ranch impoundment on Roberts Creek in Kobeh Valley; 3) the Shipley Hot Spring pond and the Flynn Ranch springs water impoundments in Diamond Valley; and 4) several small reservoirs on the upper Antelope Wash and its tributaries near the Segura Ranch in Antelope Valley. There may be other, smaller man-made impoundments in various drainages and downgradient of certain springs within the HSA that were not located in the field or identified on maps or aerial photographs.

Saline flats or playas exist where streams empty or ground water discharges into areas with no outflow. Temporary ponding occurs in such areas after snowmelt or prolonged rainfall, but the accumulated water typically soon evaporates.

3.2.2.4 Flood Hydrology

Flooding can occur in all seasons. Winter floods are caused primarily by large rainstorms falling on low-lying snow or frozen ground. Spring floods occur as warming temperatures melt the snow packs. Summer flash floods occur as the result of localized high-intensity rainfall from thunderstorms. These floods can deposit large volumes of debris and sediment on the valley uplands or valley floor and sometimes result in standing water in the playas.

Site-specific flood peak flows and total runoff volumes have not been estimated for all of the drainages described above. In the vicinity of Mount Hope, Hydro-Search (1982) evaluated peak discharge rate and time to peak discharge for 15 watersheds ranging in size from approximately 430 acres (Upper Tyrone Creek) to 12,315 acres (Garden Pass Creek). The 24-hour, 100-year peak flows for watersheds less than 2,000 acres in size were estimated to be approximately 400 to 600 cfs, and on the order of 1,000 to 3,600 cfs for larger watersheds such as Garden Pass Creek. Based on the estimates of storm runoff and general stream characteristics of the mountainous areas of Nevada, Hydro-Search (1982) indicated that the potential for flooding in the Mount Hope area as a result of 100-year flood events appears to be small. At upper elevations, the stream channels are well defined and gradients are relatively steep, which generally prevents overbank flow in the upper parts of the watersheds. Localized flooding is possible at lower elevations on the alluvial fans, particularly in the lower reaches of streams in Kobeh and Diamond Valleys, and in the Garden Valley subbasin.

3.2.2.5 Waters of the United States

SRK (2007e) conducted a survey in September of 2005 to determine the presence or absence of waters of the U.S. and jurisdictional wetlands within the Project Area. Potential wetlands within the Project Area could be supported by spring and seep flow or ephemeral surface flows. The survey and wetlands delineations were performed in accordance with Section 404 of the CWA as administered by the USACE. The survey identified approximately 1,400 square feet (0.03 acre) of wetlands, and indicated that waters of the U.S. were not present within the Mount Hope Project Area. Based on the information in the SRK report, the USACE concurred that there are no jurisdictional waters of the U.S., including wetlands, within the surveyed area that would be regulated under Section 404 of the CWA (USACE 2007). The USACE noted that all tributaries originating from Mount Hope flow southerly into Kobeh Valley, which could ultimately flow into Diamond Valley via Slough Creek, or else flow easterly into Diamond Valley via Garden Pass Creek. The USACE determined that these are isolated, intrastate closed basins with no nexus to interstate commerce. **The current determination expires in 2012. EML has requested that the USACE extend their verification of the jurisdictional determination. The USACE has requested additional information prior to completing this verification.**

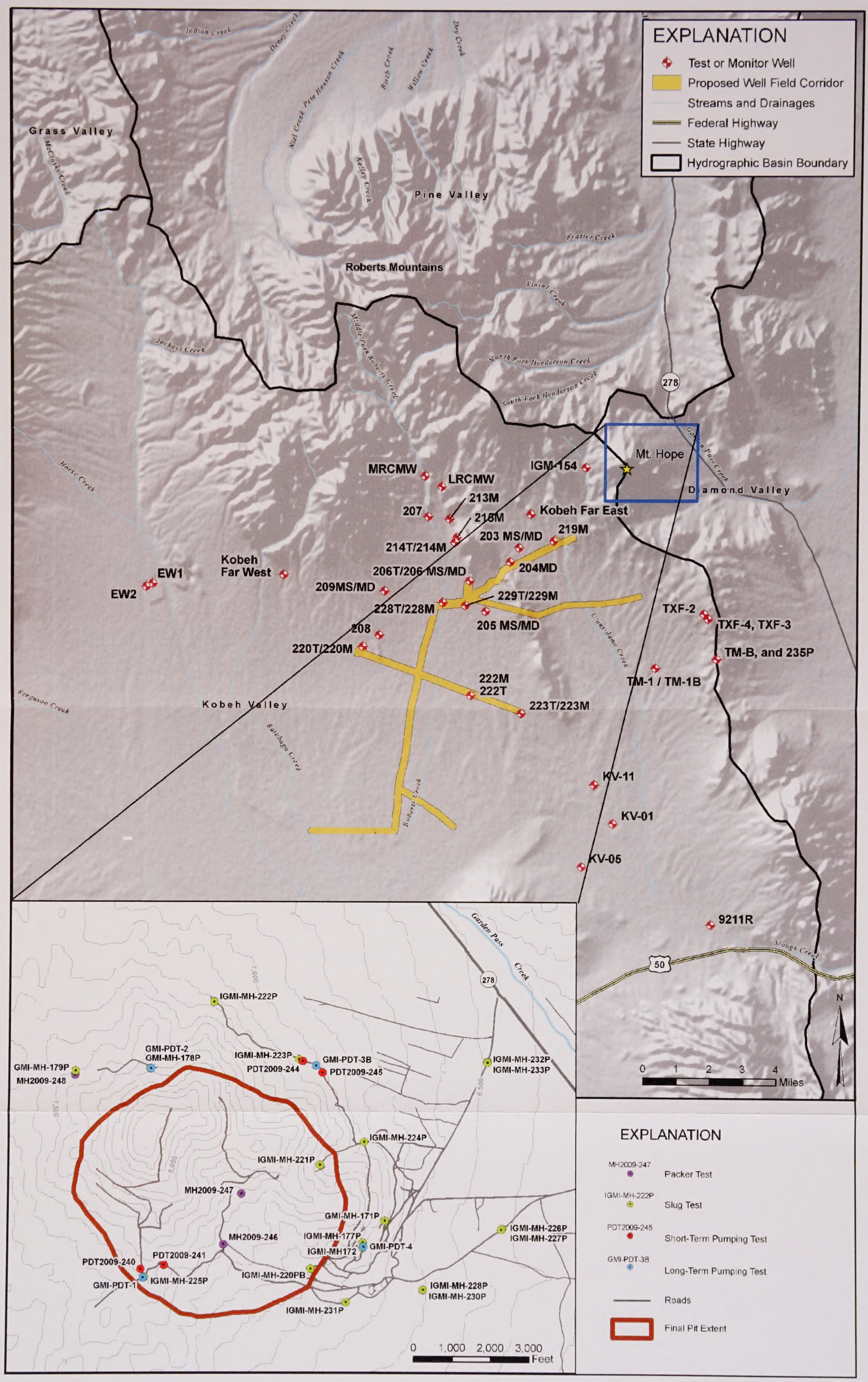
Within Pine Valley, Henderson and Vinini Creeks are the perennial drainages closest to the Project Area. In certain reaches, these creeks have defined channels, along with evidence that the drainages experience surface water flows on an average annual basis. These creeks ultimately discharge into Pine Creek, which is a tributary to the Humboldt River, a navigable waterway that is considered to be waters of the U.S.

3.2.2.6 Ground Water Resources

3.2.2.6.1 Hydrogeologic Setting

The Project Area and proposed water-supply well field (Figure 3.2.10) are located within the Diamond Valley Regional Flow System (Harrill et al. 1988), which consists of Antelope, Diamond, Kobeh, North and South Monitor Valleys, and Stevens Basin. These hydrographic basins are connected by surface and ground water flow and form an internally-drained hydrologic system that terminates in Diamond Valley. Ground water flowing into Diamond Valley is eventually discharged to springs, lost to ET from phreatophytic vegetation, consumed by pumping for agricultural, municipal, private, or industrial uses, or evaporated at the terminus of the flow system in the Diamond Valley playa. Pine Valley, to the north of the Project Area, is not part of this flow system, but is part of the Humboldt River drainage instead. Ground water resources of the HSA are mainly contained within the extensive valley-fill deposits of the hydrographic basins and, to a lesser extent, in the consolidated rocks that form the mountain blocks and underlie the valley-fill ground water systems of the valley floors.

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.


EXPLANATION
Test or Monitor Well
Proposed Well Field Corridor
Streams and Drainages
Federal Highway
State Highway
Hydrographic Basin Boundary
Indian Creek
Denay Creek
Dry Creek
Birch Creek
Willow Creek
Pete Hanson Creek
Niel Creek
Kelley Creek
Grass Valley
McClusky Creek
Pine Valley
Frazier Creek
Roberts Mountains
Vinini Creek
Jackass Creek
Middle Fork Roberts Creek
North Fork Henderson Creek
South Fork Henderson Creek
278
Mt. Hope
Garden Pass Creek
Diamond Valley
Horse Creek
MRCMW
LRCMW
IGM-154
213M
207
215M
Kobeh Far East
203 MS/MD
219M
214T/214M
Kobeh Far West
EW1
EW2
206T/206 MS/MD
204MD
209MS/MD
229T/229M
228T/228M
205 MS/MD
TXF-2
TXF-4, TXF-3
208
220T/220M
TM-B, and 235P
Lone Jack Creek
TM-1 / TM-1B
Ferguson Creek
Kobeh Valley
222M
222T
223T/223M
Rutabaga Creek
Roberts Creek
KV-11
KV-01
KV-05
9211R
Slough Creek
50
N
0 1 2 3 4 Miles
Garden Pass Creek
278
7,000
IGMI-MH-222P
GMI-PDT-2
GMI-MH-178P
IGMI-MH-223P
GMI-PDT-3B
PDT2009-244
PDT2009-245
IGMI-MH-232P
IGMI-MH-233P
GMI-MH-179P
MH2009-248
7,500
6,500
IGMI-MH-224P
8,000
IGMI-MH-221P
MH2009-247
GMI-MH-171P
IGMI-MH-226P
IGMI-MH-227P
MH2009-246
IGMI-MH-177P
GMI-PDT-4
IGMI-MH172
PDT2009-240
PDT2009-241
IGMI-MH-220PB
GMI-PDT-1
IGMI-MH-225P
IGMI-MH-228P
IGMI-MH-230P
IGMI-MH-231P
0 1,000 2,000 3,000 Feet
EXPLANATION
MH2009-247 Packer Test
IGMI-MH-222P Slug Test
PDT2009-245 Short-Term Pumping Test
GMI-PDT-3B Long-Term Pumping Test
Roads
Final Pit Extent

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, Nevada 89820

DESIGN: EMLLC	DRAWN: GSL	REVIEWED: RFD
CHECKED: -	APPROVED: -	DATE: 05/09/2011

FILE NAME: p1635_Fig3-2-X_Hydro_11i17i.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Aquifer Testing and Monitoring Locations in Kobeh Valley and Near Mount Hope

Figure 3.2.10

3.2.2.6.2 Hydrolithologic Units and Properties

Recharge, storage, and movement of ground water are dependent, in part, on the geologic conditions and topography of a site. The general stratigraphic and structural framework of the HSA is described in Section 3.4, Geology and Minerals. For the purposes of characterizing the ground water conditions in the area, the various geologic formations have been grouped into seven hydrolithologic units (Montgomery et al. 2010). The general distribution of these units is presented in Figure 3.2.6, and their physical characteristics are summarized in Table 3.2-3. These seven hydrolithologic units include two distinct types of materials: consolidated rock (carbonate and dolomite, siliciclastic rocks and conglomerate, intrusive, and volcanic bedrock), and unconsolidated to poorly consolidated sediments (volcaniclastic and lacustrine sediments, alluvium, and valley-fill deposits). In the bedrock units, recharge, storage, flow, and discharge of ground water are primarily controlled by the secondary features (fractures, faults, and solution cavities) that have enhanced the overall porosity and permeability of the rock. In the unconsolidated to poorly consolidated sediments, the ground water is stored and transmitted through interconnected pores within the sediments.

Table 3.2-3: Hydrolithologic Units within the Study Area

Hydrolithologic Unit	Hydrogeologic Map Units[1] (Geologic Age)	Estimated Thickness (feet)	Lithology	General Hydrologic Characteristics
Valley-Fill Deposits	VF1 (Quaternary)	0 to >6,700 in Kobeh Valley	Alluvial fan, landslide, and floodplain deposits, playa silt and clay, terrace gravel, colluvium.	Hydraulic conductivity ranges from < **(less than)** 1 to > **(greater than)** 100 feet per day; specific yield is approximately 0.1. Permeability generally decreases with depth due to compaction.
Volcaniclastic Sediments	VF2 (Tertiary)	10 to 370	Primarily ash-flow and air-fall tuffs.	Hydraulic properties unknown; Unit generally acts as an aquitard within the HSA.
Lacustrine Sediments and Conglomerates	VF3 (Quaternary and Tertiary)	10 to >260	Claystone, sandstone, fresh-water limestone, and conglomerate.	Hydraulic properties unknown; Unit generally acts as an aquitard except where intensely fractured.
Volcanic Rocks	VOL1 (Tertiary)	0 to 1,000	Rhyolite tuffs, basalt and andesite/dacite lava flows.	Hydraulic conductivity typically ranges from 0.01 to 10 feet per day. Local slug tests in the Mount Hope area produced conductivity values of <0.00001 feet per day. Mafic dikes of the Northern Nevada Trend are considered to be low permeability.
Intrusive Rocks	VOL2 (Cretaceous to Jurassic)	-	Granodiorite, alaskite, quartz porphyry.	Hydraulic conductivity ranges from 0.0001 to approximately 3 feet per day. The larger conductivity values correspond to locally fractured rock.
Siliciclastic Rocks	AQT1 (Permian to Cambrian)	>5,000	Quartzite, sandstone, conglomerate, chert, shale, and minor limestone.	Hydraulic conductivity ranges from <0.00001 to 100 feet per day; storage coefficient ranges from 0.00001 to 0.03. The upper values of the ranges correspond to locally fractured rock.

Hydrolithologic Unit	Hydrogeologic Map Units[1] (Geologic Age)	Estimated Thickness (feet)	Lithology	General Hydrologic Characteristics
Carbonate Rocks	CA1, CA2, CA3, CA4 (Devonian to Cambrian)	>9,000	Limestone, dolomite, siltstone, mudstone, chert, quartzite, and shale.	Hydraulic conductivity ranges from 0.005 to 900 feet per day; storage coefficient ranges from 0.00002 to 0.014. Permeability is mostly secondary due to fracturing and solution widening.

[1] See Figure 3.2.6 for distribution of hydrolithologic units.
Sources: Belcher et al. (2001); Harrill and Prudic (1998); Interflow (2010); Maurer et al. (1996); Montgomery et al. (2010); Plume (1996); Winograd and Thordarson (1975).

Bedrock Units

The carbonate hydrolithologic units correlate to the eastern assemblage Paleozoic rocks discussed in Section 3.4, Geology and Minerals. Montgomery et al. (2010) define four carbonate hydrolithologic units within the HSA: 1) the lower eastern assemblage formations (Eureka Quartzite, Pogonip Group, and Hamburg Dolomite), which are deeply buried throughout Kobeh Valley and are exposed within the HSA only at Lone Mountain; 2) the Roberts Mountains and Lone Creek Dolomite Formations, which both crop out on the flanks of Lone Mountain in Kobeh Valley and also in isolated blocks on the north side of the Roberts Mountains in Pine Valley; 3) the Nevada, McColley Canyon Formation, and Denay Limestone Formation, which crop out in the Roberts Mountains, Sulphur Spring Range, and Lone Mountain area of Kobeh Valley; and 4) the Devils Gate Limestone, which crops out in the Roberts Mountains, Devils Gate area, and Mahogany Hills. Where sufficiently fractured or dissolved, these units may provide large quantities of water to wells or springs.

The hydrologic properties of carbonate rocks in the northern part of Kobeh Valley were evaluated by Interflow (2010) as part of the baseline characterization of hydrogeologic conditions in the proposed well field area. Figure 3.2.10 shows the locations of wells used in aquifer tests in the northern part of Kobeh Valley and near the proposed open pit at Mount Hope. Aquifer pumping tests were conducted for periods ranging from seven to 32 days on three test production wells (206T, 214T, and 220T) completed in the carbonate bedrock. Aquifer test data from the proposed well field area indicate that the local hydraulic conductivity of the carbonate bedrock generally ranges between eight and 18 feet per day and the storage coefficient is estimated to range from 0.0001 to 0.002. During testing of one of the wells (206T), a hydraulic conductivity value of 254 feet per day was estimated based on the early-time test data; however, the rate of drawdown increased with time as the test continued and the corresponding estimated hydraulic conductivity values decreased to approximately nine feet per day during the later part of the test (Interflow 2010), consistent with the range of values listed above for carbonate rocks in the northern part of Kobeh Valley. Interflow interpreted this behavior to indicate that the well was pumping from a highly permeable zone of fractured or dissolved carbonate rock that is also limited in its areal extent by barriers to ground water flow (i.e., compartmentalized).

The carbonate aquifer is a regionally extensive hydrolithologic unit in large portions of eastern and central Nevada. Aquifer test results throughout the region indicate that the carbonate aquifer has a wide range of hydraulic conductivity. For example, in the Carlin Trend area, just north of

Pine Valley, the hydraulic conductivity and storage coefficient of the carbonate aquifer units are estimated to range from 0.1 to 150 feet per day and 0.00002 to 0.014, respectively (Maurer et al. 1996). At the Nevada Test Site, the carbonate aquifer has an estimated hydraulic conductivity that ranges from 0.7 to 700 feet per day (Winograd and Thordarson 1975). Harrill and Prudic (1998) and Plume (1996) reported values of hydraulic conductivity for carbonate aquifer regions of eastern Nevada that range from 0.005 to 900 feet per day.

The siliciclastic hydrolithologic unit correlates to the western assemblage Paleozoic rocks of the Webb and Vinini Formations and the Garden Valley Formation of the Overlap assemblage as described in Section 3.4, Geology and Minerals. This hydrolithologic unit is composed of chert, shale, calcareous sandstone, silica-cemented conglomerate, and quartzite, with minor amounts of fine-grained limestone. Within the HSA, siliciclastic rocks are exposed on the west side of the Sulphur Spring Range and north side of the Roberts Mountains in Pine Valley, on the southwestern flanks of the Roberts Mountains and northern part of the Simpson Park Mountains in Kobeh Valley, at Mount Hope and Whistler Mountain, and in the Diamond Mountains on the east side of Diamond Valley. Except in windows where these rocks have been removed by uplift and erosion, the siliciclastic hydrolithologic units generally overlie the carbonate hydrolithologic units. Where sufficiently fractured, the siliciclastic rocks may be water bearing. However, in general, this hydrolithologic unit is thought to have limited water production potential and is interpreted to typically act as an aquitard (Montgomery et al. 2010).

Site-specific hydrologic property values for siliciclastic rocks (primarily Vinini Formation) were determined from slug, packer, and pumping tests performed in core holes, piezometers, and completed wells in the vicinity of Mount Hope and the proposed open pit (Montgomery & Associates 2010). The results indicate a range of hydraulic conductivities for the various geologic media in that area, which included some volcanic and metamorphic rocks. Slug tests in three piezometers (228P, 231P, and 232P) in the Vinini Formation outside of the proposed open pit area produced hydraulic conductivity values ranging from approximately 0.0002 to 0.15 feet per day. Packer tests in a deep core hole (248) in the Vinini Formation outside of the proposed open pit showed hydraulic conductivity ranging from a value of one foot per day at a depth of approximately 434 feet bgs to a value of less than 0.00001 feet per day at a depth of approximately 3,000 feet bgs. Short-term pumping tests in two monitor wells (240 and 241) completed in the Vinini Formation (and some metamorphic rock) near the boundary of the proposed open pit produced estimated hydraulic conductivity values of 0.00067 and 0.26 feet per day. Longer term pumping tests in two test-production wells (PDT-1 and PDT-2) completed in the Vinini Formation (and rhyolite tuff) near the proposed open pit boundary were analyzed using the dual-porosity method of Moench (1984). Based on that analysis, the hydraulic conductivity of fractures was estimated to range from approximately 0.005 to 0.2 feet per day, and matrix hydraulic conductivity was estimated to range from approximately 0.0001 to 0.0003 feet per day. The fracture-specific storage ranged from 3.7^{-10} to 3.5^{-06}, whereas the matrix-specific storage ranged from 8.3^{-07} to 2.3^{-03}.

No aquifer tests have been conducted in rocks of the siliciclastic hydrolithologic unit elsewhere within the HSA except for the Mount Hope area because these rocks typically are not targets for water production. In the Carlin Trend, reported ranges of hydraulic conductivity and storage coefficient are approximately 0.001 to 100 feet per day and 0.00001 to 0.03, respectively, for similar rocks (Maurer et al. 1996). In general, except along faults and fracture zones, the hydraulic conductivities of siliciclastic rocks are low and they tend to act as barriers to regional ground water flow (Plume 1996).

Rocks comprising the volcanic hydrolithologic unit include Tertiary rhyolitic tuffs, basalt, andesite, and dacite lava flows. Within the HSA, volcanic rocks primarily occur as follows: in the Monitor and Antelope Ranges of Antelope Valley; at the northern end of the Monitor Range and in the southern part of the Simpson Park Mountains in Kobeh Valley; in the northern part of the Simpson Park Mountains and on the east side of the Cortez Mountains in Pine Valley; and in the central and eastern parts of the Roberts Mountains, generally along the north-northwest trend of the Northern Nevada Rift. Scattered outcrops of volcanic rocks also exist in Diamond Valley. Volcanic rocks also underlie basin-fill deposits in each of the basins of the study area at different depths (Tumbusch and Plume 2006).

Site-specific hydrologic property values for volcanic rocks (primarily rhyolite tuff) were determined from slug tests and pumping tests performed in piezometers and completed wells in the vicinity of Mount Hope and the proposed open pit (Montgomery & Associates 2010). The results indicate a wide range of hydraulic conductivities for the volcanic rocks in that general area. Slug tests in three piezometers (227P, 230P, and 233P) in unaltered rhyolite tuff outside of the proposed open pit produced hydraulic conductivity values ranging from 0.0000027 to 0.000094 feet per day. Short-term pumping tests in two monitoring wells (244 and 245) completed in rhyolite tuff near the boundary of the proposed open pit produced estimated hydraulic conductivity values of 0.25 and 0.44 feet per day. A long-term (26-day) pumping test conducted in a test-production well (PDT-3B) completed in rhyolite tuff near the proposed open pit boundary resulted in an estimated fracture hydraulic conductivity of 0.1 feet per day and an estimated matrix hydraulic conductivity of 0.000005 feet per day, based on the dual-porosity method of analysis (Moench 1984).

The hydraulic conductivity of volcanic rocks in the Carlin Trend area range from 0.01 to ten feet per day (Maurer et al. 1996). At the Nevada Test Site, measured values of the hydraulic conductivity of volcanic rocks, consisting of lava flows and ash-fall tuffs, range from approximately 1.5 to 17 feet per day (Winograd and Thordarson 1975). Plume (1996) reported that 54 drill-stem tests in volcanic rocks in the Railroad and White River Valleys in eastern Nevada produced hydraulic conductivity values that range from 0.000001 to 0.3 feet per day, with a mean value of 0.02 feet per day.

Tumbusch and Plume (2006) indicate that volcanic rocks probably have low permeability over much of the study area, citing the number of perennial stream segments underlain by volcanic rocks that exist within watersheds in the southern part of the Diamond Valley Flow System.

The intrusive hydrolithologic unit primarily consists of Jurassic to Tertiary granitic rocks. Within the HSA, intrusive igneous rocks are exposed in the central Simpson Park Mountains, at Whistler Mountain on the southwest side of Diamond Valley, and in the Cortez Mountains on the west side of Pine Valley. Igneous intrusive rocks (quartz porphyry) also occur locally at Mount Hope. The extent of the outcrop area of these rocks generally does not indicate the full extent of the intrusive body in the subsurface.

Site-specific hydrologic property values for intrusive rocks (quartz porphyry mixed with altered tuffs and hornfels) were determined from packer tests of two core holes (246 and 247) in the vicinity of Mount Hope and the proposed open pit (Montgomery & Associates 2010). The tested depths ranged from approximately 560 to 2,760 feet bgs. Based on the packer-test results, hydraulic conductivity values were estimated to range from 0.0001 to 0.1 feet per day, with the smaller values generally corresponding to the upper (potassic) zones and the higher values correlated with the lower (silicic) zones of the core holes.

No aquifer tests have been conducted in rocks of the intrusive hydrolithologic unit within the HSA because these rocks typically are not targets for water production. Reported hydraulic conductivity values of granodiorite intrusions in the Carlin Trend area are approximately three to five feet per day where the rocks are highly fractured (Maurer et al. 1996). However, where fracturing is less extensive, intrusive rocks generally have very low permeability and impede the movement of ground water (Plume 1996). Belcher et al. (2001) report horizontal hydraulic conductivity values from 0.002 to 3.3 feet per day for Jurassic to Oligocene granodiorite, quartz monzonite, granite, and tonalite in southern Nevada and parts of California.

Basin Fill Deposits

The basin-fill (or valley-fill) hydrolithologic units consist of heterogeneous mixtures of fine-, medium-, and coarse-grained material eroded from mountain ranges and deposited in adjacent basins. Montgomery et al. (2010) define three basin-fill hydrolithologic units within the HSA, all of which are of late Tertiary to Quaternary: 1) younger and older alluvium, 2) volcaniclastic sediments, and 3) lacustrine deposits. The younger and older alluvium hydrolithologic unit comprises unconsolidated to semi-consolidated deposits of alluvial fans, landslides, stream flood plains, playas, and terrace deposits, which are locally interbedded with volcaniclastic sediments. The volcaniclastic sediment hydrolithologic unit consists primarily of reworked ash-flow or air-fall tuffs. The lacustrine deposit hydrolithologic unit includes claystone, sandstone, fresh-water limestone, and conglomerate. Within the HSA, these units partially fill the structural basins between mountain ranges.

The hydrologic properties of the younger and older alluvial sub-units of the basin-fill units in the northern part of Kobeh Valley were evaluated by Interflow (2010) as part of the baseline characterization of hydrogeologic conditions in the proposed well field area. Volcanoclastic and lacustrine units were not evaluated in the HSA and are generally not considered to be major water producing units. Aquifer pumping tests were conducted for periods ranging from five to seven days on three test production wells (222T, 228T, and 229T) completed in the alluvium of the proposed well field area. The completed intervals of the test wells ranged from 240 to 990 feet bgs. Aquifer test data from those wells indicate that the hydraulic conductivity of the alluvium in the well field area range from five to 19 feet per day and the storage coefficient is estimated to range from 0.0001 to 0.005. Montgomery & Associates (2008) evaluated short-term (approximately two hours to one day) aquifer tests conducted in three alluvial wells (9211R, EW-1, and KV-11) in eastern Kobeh Valley that were drilled as part of previous exploration efforts. The completed intervals of the test wells range from approximately 40 to 800 feet bgs. Reported hydraulic conductivity values of alluvium estimated from those aquifer tests range from six to 57 feet per day. In other basins of central and eastern Nevada, the estimated hydraulic conductivity of basin-fill deposits ranges from less than one foot per day to more than 100 feet per day (Plume 1996).

3.2.2.6.3 Hydrostructural Features

Ground water flow pathways are influenced by major faults and by complexities of the geologic environment that offset and displace rock units and older alluvial deposits. Depending on the physical properties of the rocks involved, faulting may create either barriers or conduits for ground water flow. For example, faulting of softer, less competent rocks typically forms zones of crushed and pulverized rock material (gouge) that behave as barriers to ground water movement. Faulting of hard, competent rocks often creates conduits along the fault trace, resulting in zones of higher ground water flow and storage capacity along the fault trace compared to the unfaulted surrounding rock.

Interflow (2010) describes three types of faults in the HSA that can be hydrologically important: thrust faults, normal faults, and young faults. The thrust faults are generally oriented north-south and reflect the eastward thrusting of western assemblage siliciclastic rocks over eastern assemblage carbonate rocks. In some cases, thrust fault contacts have fine-grained gouge and may also be associated with mineralization, both of which can reduce the permeability of the fault zone relative to the surrounding rocks. The tectonic activity that produced Basin and Range block faulting resulted in numerous northwest to southeast and conjugate east-northeast to west-southwest-trending high-angle normal faults. In the Roberts Mountains, some of these structures are thought to have provided conduits for the upward movement of mineralized fluids. Such mineralization associated with faults and the juxtaposition of rocks with contrasting hydraulic properties can create barriers to ground water movement, which lead to horizontal compartmentalization of the preexisting Paleozoic sedimentary rocks. Young faults are Quaternary structures that often act as conduits for ground water flow due to their relatively recent formation. Young faults in the HSA, as mapped by Dohrenwend et al. (1996), are located on the west side of the Roberts Mountains; on the north, south, and southwest sides of Lone Mountain; in the south-central part of the Roberts Mountains; and on the eastern side of Kobeh Valley.

As described in Section 3.4, Geology and Minerals, three Quaternary faults have been mapped within ten miles of the Project Area. Another group of normal faults in the Garden Valley area appear to down-drop to the Quaternary deposits of Garden Valley and place them in contact with Paleozoic and Tertiary bedrock of the Roberts Mountains and Sulphur Spring Range. A northwest-striking fault that follows the southwestern flank of the Roberts Mountains approximately ten miles southwest of Mount Hope is a major range front fault that appears to continue to the southeast beneath the piedmont-slope deposits of northern Kobeh Valley. None of these faults has been studied in detail and very little is known concerning their nature, movement history, and hydrogeologic behavior.

Dikes of basaltic composition have intruded fractures in carbonate rocks of the Roberts Mountains in a north-northwest-trending zone approximately six miles long and three to four miles wide, which are part of the Northern Nevada Rift. The average width of individual dikes is less than ten feet, although some are as wide as 50 feet, with lengths ranging from a few hundred feet to one or two miles (Tumbusch and Plume 2006). The hydrologic effect of the dikes is that they have reduced the fracture porosity and permeability of the carbonate rocks. The inferred extent of the zone of dikes across Kobeh Valley to the southeast, at least as far as the northern end of the Fish Creek Range, means that the dikes may create major barrier to ground water flow in these areas of carbonate rocks.

3.2.2.6.4 Ground Water Elevations and Flow Directions

Montgomery et al. (2010) compiled water level data for the HSA basins from published and unpublished sources. The majority of water level records were obtained from the USGS National Water Information System (NWIS) database (NWIS 2007). Some records were obtained from piezometers and monitoring wells in the Mount Hope area (Montgomery & Associates 2010) and from data published in USGS and Nevada Department of Natural Resources Reconnaissance Series Reports (Eakin 1961 and 1962; Rush and Everett 1964). Harrill (1968) was used as a source of historic water level data for Diamond Valley. Additional historic and more recent (2005) data for Antelope, Diamond, Kobeh, Pine, and North and South Monitor Valleys were obtained from Tumbusch and Plume (2006). In total, more than 4,400 water level measurements were assembled into an electronic database for this study, which includes data from 551 locations and spans the time period from 1900 to 2009 (Montgomery et al. 2010, Appendix F).

The locations of wells used to define ground water elevations in the basin-fill aquifers of the HSA under pre-development conditions (circa 1955) are shown in Figure 3.2.11. Contours of ground water elevations under pre-development conditions show that northward trending ground water flows from North Monitor and Antelope Valleys and easterly trending ground water flows from the Simpson Park Mountains and southerly trending ground water flows from the Roberts Mountains converge to an area of ground water discharge by ET in central and eastern Kobeh Valley. Ground water not discharged by ET in Kobeh Valley would have been directed eastward toward Devil's Gate and then eventually into the southern part of Diamond Valley at that time. Prior to irrigation development in the 1960s, ground water flow in Diamond Valley was from valley margins toward the valley axis and then northward to the large playa discharge area at the north end of the valley. In the Pine Valley basin, the primary flow pattern was laterally inward from the mountains toward the axis of the valley and then to the northeast, generally following the course of Pine Creek toward the Humboldt River.

The ground water elevations in the basin-fill aquifers of the HSA in 2005, interpreted from the available data, are shown in Figure 3.2.12. The 2005 water levels in North Monitor, Antelope, Kobeh, and Pine Valleys are interpreted to be generally the same as those shown for pre-development conditions (Figure 3.2.11). However, after approximately 40 years of agricultural pumping, a large area of ground water decline has developed in the basin-fill aquifer of southern Diamond Valley around the irrigated area, and the decline has created a divide between northward flow to the playa discharge area and southward flow to the pumped area. Tumbusch and Plume (2006) report that in 2005 water levels in the southern part of Diamond Valley exhibited a decline of as much as 90 feet relative to pre-irrigation development conditions. According to Montgomery et al. (2010), the water level data compiled for this study indicate that historic and continuing rates of water level declines range from approximately 1.3 to 3.3 feet per year for the wells in southern Diamond Valley.

In the proposed Mount Hope open pit area, ground water levels were measured in approximately 40 piezometers and wells between 2007 and 2009 (Montgomery & Associates 2010). The measured ground water elevations range from greater than 7,200 feet amsl near the summit of Mount Hope to less than 5,800 feet amsl approximately six miles east of the summit in Diamond Valley. The ground water elevations and directions of movement in the proposed open pit area appear to be correlated with topography, and a local ground water divide may exist approximately one mile northwest of the proposed open pit (Montgomery & Associates 2010). Locally confined ground water conditions have been encountered at a few locations in the vicinity of the proposed open pit, with some recorded water pressures corresponding to hydraulic heads nearly 200 feet above the local ground surface.

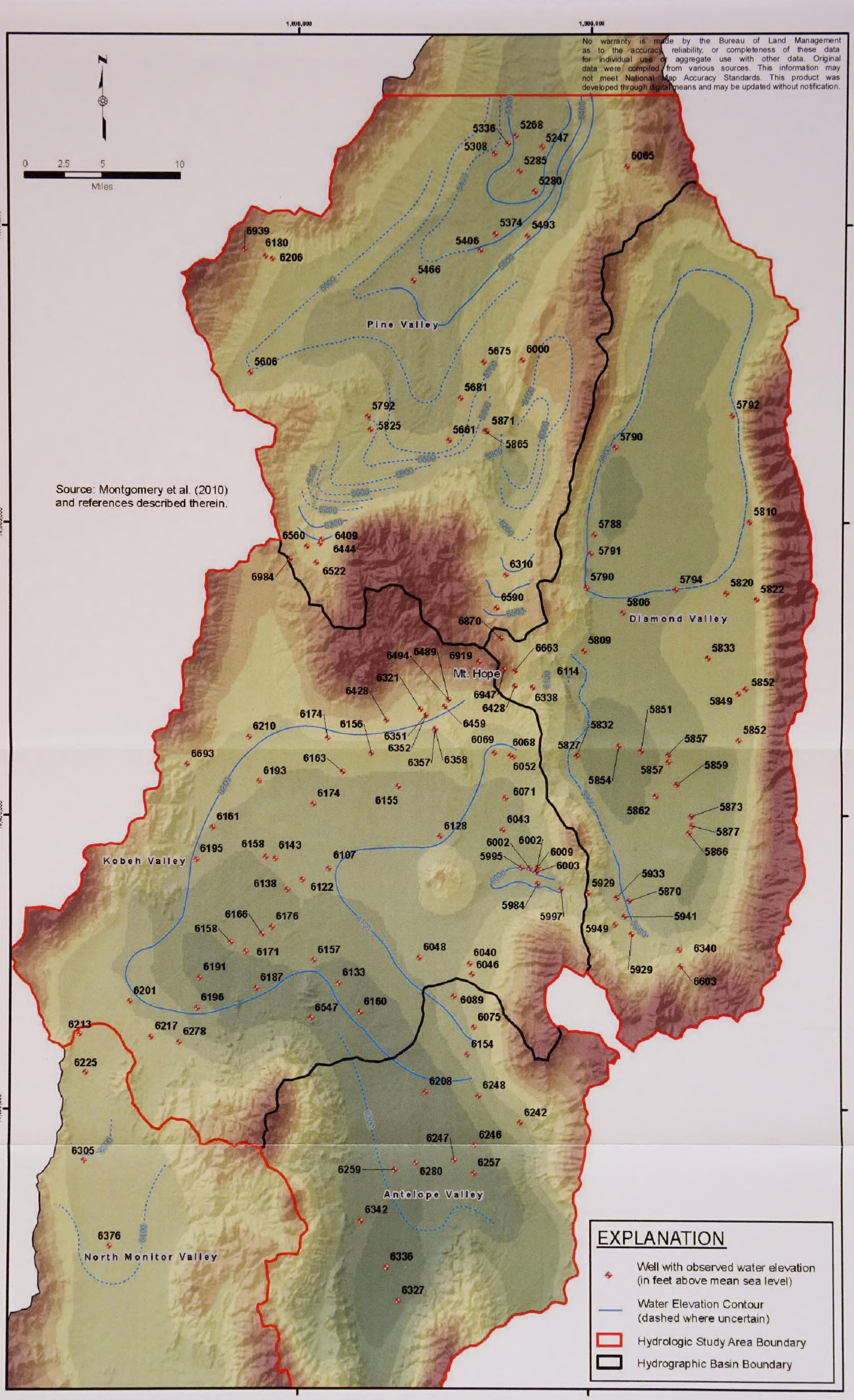
Flowing (artesian) wells also have been encountered in each of the basins in the HSA and their reported locations are shown on the individual basin detail maps (Figures 3.2.2 through 3.2.5). In the 1960s, the estimated individual discharges from 14 flowing wells within the HSA ranged from approximately five to 233 gallons per minute (Montgomery et al. 2010).

3.2.2.6.5 Ground Water Recharge and Discharge

Inflow and outflow from the ground water system were estimated by Montgomery et al. (2010) to establish a baseline water balance for the HSA. The estimated average annual ground water budgets for pre-development (circa 1955) and existing (2009) conditions are presented in Tables 3.2-4 and 3.2-5, respectively. Existing ground water inflow components include precipitation recharge and subsurface inflow from North Monitor Valley across the southern HSA boundary into Kobeh Valley. Ground water outflow components include the following: **ET** from phreatophyte areas in each of the HSA basins; evaporation from the playa area at the north end of Diamond Valley; ground water withdrawal for irrigation, municipal, domestic, and mining uses; discharge at springs and seeps; and subsurface outflow across the northern HSA boundary in Pine Valley.

The largest contribution to ground water recharge comes from precipitation in the mountain ranges of the HSA, with stream runoff from snowmelt considered to be part of that contribution. As is typical in Nevada, the higher elevations generally receive more rain and snow than lower elevations. This increase in precipitation at higher elevations recharges the bedrock aquifers and local perched systems through fractures in the bedrock outcrops or where bedrock is a porous sedimentary or volcanic unit. Where streams emerge from the mountains, some of the stream flow is lost as water infiltrates and recharges the alluvium.

Recharge to the ground water system from direct precipitation was estimated using an empirically-derived relationship between precipitation, recharge, and altitude developed by Maxey and Eakin (1949) and Eakin et al. (1951). The Maxey-Eakin relationship is based on a distribution of average annual precipitation into zones, with the amount of ground water recharge in each zone determined by empirically-derived recharge coefficients. For this study, the precipitation-altitude relationships and recharge coefficients reported in the USGS and Nevada Department of Natural Resources Reconnaissance Series Reports (Eakin 1961 and 1962; Rush and Everett1964) and in Harrill (1968) were utilized in combination with more recent (updated) calculations of precipitation-zone areas to estimate recharge for each basin in the HSA. The methodology used to estimate recharge is described in Montgomery et al. (2010). On the basis of the updated Maxey-Eakin calculations, and accounting for the spatial distribution of recharge to different landforms, the total recharge to the HSA is estimated to be approximately 75,900 afy (Tables 3.2-4 and 3.2-5).


1,000,000
1,300,000
N
0 2.5 5 10
Miles
14,600,000
14,500,000
14,400,000
14,300,000
Pine Valley
Diamond Valley
Mt. Hope
Kobeh Valley
Antelope Valley
North Monitor Valley
EXPLANATION
Well with observed water elevation (in feet above mean sea level)
Water Elevation Contour (dashed where uncertain)
Hydrologic Study Area Boundary
Hydrographic Basin Boundary

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Source: Montgomery et al. (2010) and references described therein.

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HSA Basin-Fill Aquifer Groundwater Elevations Prior to Development (circa 1955)

Figure 3.2.11

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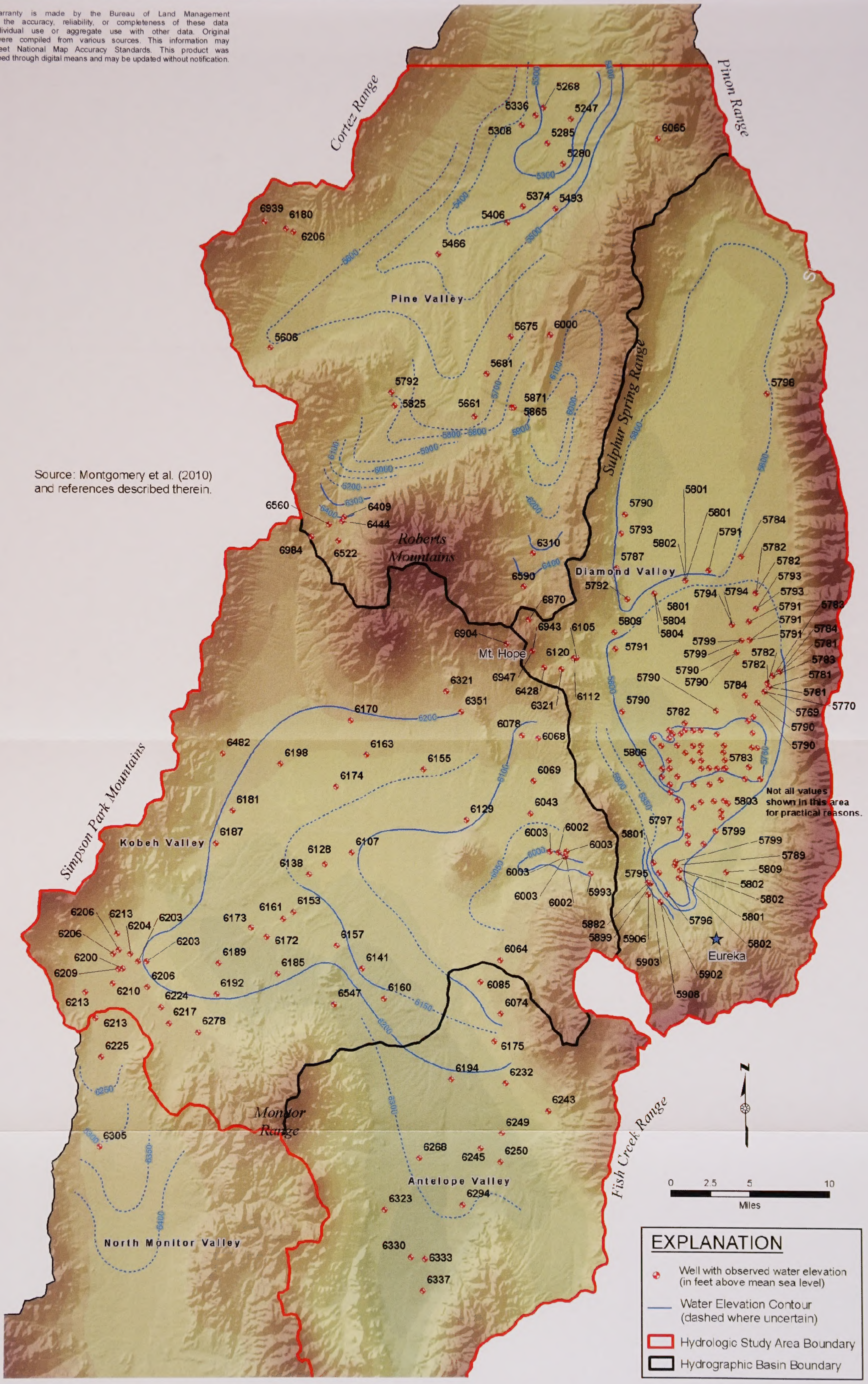
Cortez Range
Pinon Range
Pine Valley
Sulphur Spring Range
Roberts Mountains
Diamond Valley
Mt. Hope
Eureka
Kobeh Valley
Simpson Park Mountains
Monitor Range
Antelope Valley
North Monitor Valley
Fish Creek Range
Not all values shown in this area for practical reasons.
N
0
2.5
5
10
Miles
5268
5336
5247
5308
5285
5280
6065
5374
5493
5406
5466
6939
6180
6206
5606
5675
6000
5681
5792
5825
5661
5871
5865
5798
6560
6409
6444
6984
6522
6310
6590
6870
6904
6943
6105
6120
6947
6321
6428
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6068
6170
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6198
6163
6155
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5801
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5783
5809
5804
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5804
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5791
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5790
5769
5782
5790
5790
5806
5783
5803
5797
5801
5799
5799
5789
5809
5795
5802
5802
5801
5796
5882
5899
5906
5802
5903
5902
5908

Source: Montgomery et al. (2010) and references described therein.

EXPLANATION

●	Well with observed water elevation (in feet above mean sea level)
—	Water Elevation Contour (dashed where uncertain)
🟥	Hydrologic Study Area Boundary
⬛	Hydrographic Basin Boundary

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Hydrologic Study Area Basin-Fill Aquifer Ground Water Elevations in 2005

Figure 3.2.12

Table 3.2-4: Pre-Development (circa 1955) Estimated Annual Ground Water Budget for Individual Basins and the Entire HSA[1]

Budget Component	Antelope Valley	Diamond Valley	Kobeh Valley	Pine Valley (within HSA)	Entire HSA
Ground Water Inflow[2] (afy)					
Precipitation Recharge[4]	4,100	21,400	13,200	34,900	73,600
Subsurface Inflow[5]	0	7,300 (5,700 from Pine Valley and 1,600 from Kobeh Valley)	4,600 (1,400 from Monitor Valley, 2,700 from Antelope Valley, and 500 from Pine Valley)	0	1,400 (from Monitor Valley to Kobeh Valley)
Total Inflow	**4,100**	**28,700**	**17,800**	**34,900**	**75,000**
Ground Water Outflow[2] (afy)					
Evapotranspiration[3,6]	1,400	27,600	16,200	17,100	62,300
Net Ground Water Pumping[7]	negligible	800	negligible	negligible	800
Subsurface Outflow[5]	2,700 (to Kobeh Valley)	0	1,600 (to Diamond Valley)	17,500 (5,700 to Diamond Valley, 500 to Kobeh Valley, and 11,300 to northern Pine Valley)	11,300 (from southern to northern Pine Valley)
Total Outflow	**4,100**	**28,400**	**17,800**	**34,600**	**74,400**
Inflow - Outflow	**0**	**300**	**0**	**300**	**600**

[1] Estimation based on sources of data and methods described in Montgomery et al. (2010), including results from the calibrated numerical ground water model.

[2] Values rounded to nearest 100 afy.

[3] Includes ET from phreatophyte areas and evaporation from playas and spring discharge.

[4] Source: Montgomery et al. (2010), Table 4.1-5.

[5] Source: Montgomery et al. (2010), Table 4.1-13.

[6] Source: Montgomery et al. (2010), Table 4.1-12.

[7] Source: Montgomery et al. (2010), Table 3.5-4.

Table 3.2-5: 2009 Estimated Annual Ground Water Budget for Individual Basins and the Entire HSA[1]

Budget Component	Antelope Valley	Diamond Valley	Kobeh Valley	Pine Valley (within HSA)	Entire HSA
Ground Water Inflow[2] (afy)					
Precipitation Recharge[4]	4,100	21,400	13,200	34,900	73,600

Budget Component	Antelope Valley	Diamond Valley	Kobeh Valley	Pine Valley (within HSA)	Entire HSA
Subsurface Inflow[5]	0	7,800 (5,800 from Pine Valley and 2,000 from Kobeh Valley)	4,800 (1,600 from Monitor Valley, 2,700 from Antelope Valley, and 500 from Pine Valley)	0	1,600 (from Monitor Valley to Kobeh Valley)
Total Inflow	**4,100**	**29,200**	**18,000**	**34,900**	**75,200**
Ground Water Outflow[2] (afy)					
Evapotranspiration[3,5]	1,400	14,700	15,900	17,100	49,100
Net Ground Water Pumping[6]	negligible	55,800	2,900	negligible	58,700
Subsurface Outflow[5]	2,700 (to Kobeh Valley)	0	2,000 (to Diamond Valley)	17,600 (5,800 to Diamond Valley, 500 to Kobeh Valley, and 11,300 to northern Pine Valley)	11,300 (from southern to northern Pine Valley)
Total Outflow	**4,100**	**70,500**	**20,800**	**34,700**	**119,200**
Inflow - Outflow	**0**	**-41,300**	**-2,800**	**200**	**-44,000**

[1] Estimation based on sources of data and methods described in Montgomery et al. (2010), including results from the calibrated numerical ground water model.
[2] Values rounded to nearest 100 afy.
[3] Includes ET from phreatophyte areas and evaporation from playas and spring discharge.
[4] Source: Montgomery et al. (2010), Table 4.1-5.
[5] Source: Montgomery et al. (2010), Table 4.4-4.
[6] Source: Montgomery et al. (2010), Figure 4.4-2.

Another source of inflow to the ground water system of the HSA is subsurface flow that enters Kobeh Valley from the adjacent North Monitor Valley to the south. The amount of subsurface flow from North Monitor Valley to Kobeh Valley is estimated to be approximately 1,900 afy under existing (2009) conditions (Montgomery et al. 2010), as shown in Table 3.2-5.

As shown in Table 3.2-4, ET is the primary mechanism of ground water loss from the HSA. Evaporation takes place from soil, wet plant surfaces, and open water bodies, whereas transpiration occurs by the action of plants. ET of ground water happens in areas where the water table is shallow, including areas near springs and seeps and along the valley floors of the HSA basins. Plants that send their roots to the water table and depend upon a constant supply of ground water are termed phreatophytes. Some phreatophytes, such as greasewood (*Sarcobatus* spp.), commonly send their roots as deep as 50 feet to the water table, although depths of up to 80 feet were reported by Eakin et al. (1951). **Rabbitbrush (*Chrysothamnus* and *Ericameria* spp.) is also considered a phreatophyte, although it has a dimorphic root structure with fine roots in the upper soil profile and woody tap roots that extend to near the water table at greater than 13-foot depths, however, depths of up to 48 feet have been reported**

(McLendon 2011). The existing phreatophyte areas in the HSA are mainly found along the axial drainages of Antelope, Kobeh, and Pine valleys and surrounding the playa areas in the northern part of Diamond Valley. The depth to water, vegetation type and density, soil characteristics, and climatic factors all influence the amount of ground water that phreatophytes transpire. Including evaporation from playa areas and spring and seep discharges, the total ET for the HSA under pre-development (circa 1955) conditions is estimated to be approximately 62,300 afy (Table3.2-4), and is approximately 49,100 afy under existing (2009) conditions (Table 3.2-5), as described in Montgomery et al. (2010).

Other sources of natural ground water outflow include subsurface flow from the southern part of Pine Valley across the northern boundary of the HSA. The amount of subsurface flow from the southern part of Pine Valley across the northern boundary of the HSA is estimated to be approximately **11,300** afy under existing (2009) conditions (Montgomery et al. 2010), as shown in Table 3.2-5.

3.2.2.6.6 Ground Water Uses

Pumping withdrawals for irrigation, municipal, domestic, and mining uses account for the greatest amount of the ground water discharges from the HSA. Available data indicate that the distribution and amount of ground water pumping within the HSA has increased over time.

Development of ground water resources in Diamond Valley began in 1949, when two wells were installed along the eastern boundary of the valley (Eakin 1962). Additional wells installed prior to 1960 were located primarily along the periphery of the valley to augment flows from springs. An estimated 238 wells had been drilled in Diamond Valley by the end of 1965, with over 150 of those wells drilled between 1960 and 1965. Although numerous, the wells were not heavily pumped until 1972, when electrical power became available in Diamond Valley to supplement wind and diesel power (Arteaga et al. 1995). This change in technology, coupled with the increased price for alfalfa and the development of center-pivot irrigation, eventually caused a shift away from row crops and resulted in a significant increase in ground water withdrawals. Currently, the majority of irrigation is centered in south-central Diamond Valley and along the eastern portion of the valley

On a much smaller scale, irrigation development in Kobeh Valley followed a similar progression, and by 2005, approximately 1,000 acres of alfalfa were being irrigated along the basin's western border. Existing ground water resources in the basin are still considered to be largely undeveloped (Tumbusch and Plume 2006) because of the limited scale of ground water withdrawals in Kobeh Valley.

Montgomery et al. (2010) summarized ground water pumping withdrawals from the HSA basins on the basis of published estimates of ground water withdrawals from Diamond Valley (Arteaga et al. 1995; Eakin 1962; Harrill 1968); detailed crop surveys and basin-estimate aggregates from the NDWR (1961-2005) for Diamond and Kobeh Valleys; estimates of public water-system requirements based on population for Nevada public water systems (Lopes and Evetts 2004); and pumping records from the Ruby Hill Mine. In the year 1955, under pre-development conditions, Montgomery et al. (2010) report that a total of approximately 800 afy of ground water was being pumped from the Diamond Valley basin, with negligible amounts being pumped from the other HSA basins at that time (Table 3.2-4). Under existing (2009) conditions, total consumptive use of ground water for agricultural purposes (minor mining and municipal uses) is estimated to be approximately 55,850 afy from the Diamond Valley basin and approximately 4,500 afy from the Kobeh Valley basin, with negligible amounts being pumped from Antelope Valley and the southern portion of Pine Valley within the HSA (Table 3.2-5).

3.2.2.6.7 Land Subsidence Due to Ground Water Withdrawals

Prolonged ground water withdrawals in the southern part of Diamond Valley have resulted in depressurization and some consolidation of the basin-fill aquifer, which in turn, has produced land surface subsidence in that area. Estimates of the cumulative subsidence in Diamond and Kobeh Valleys for the years 1992 to 2000 were made based on satellite-derived Interferometric Synthetic Aperture Radar (InSAR) data. The methodology consists of utilizing two satellite radar scenes acquired over the same area at different times to determine radar phase changes produced by small displacements of the ground surface (Bell 2008). In the case of land subsidence due to ground water withdrawals, aquifer consolidation results in centimeter-scale changes of the ground surface that are detectable with InSAR data. A detailed description of the methods used to estimate land subsidence in Diamond Valley is presented in Bell and Arai (2009).

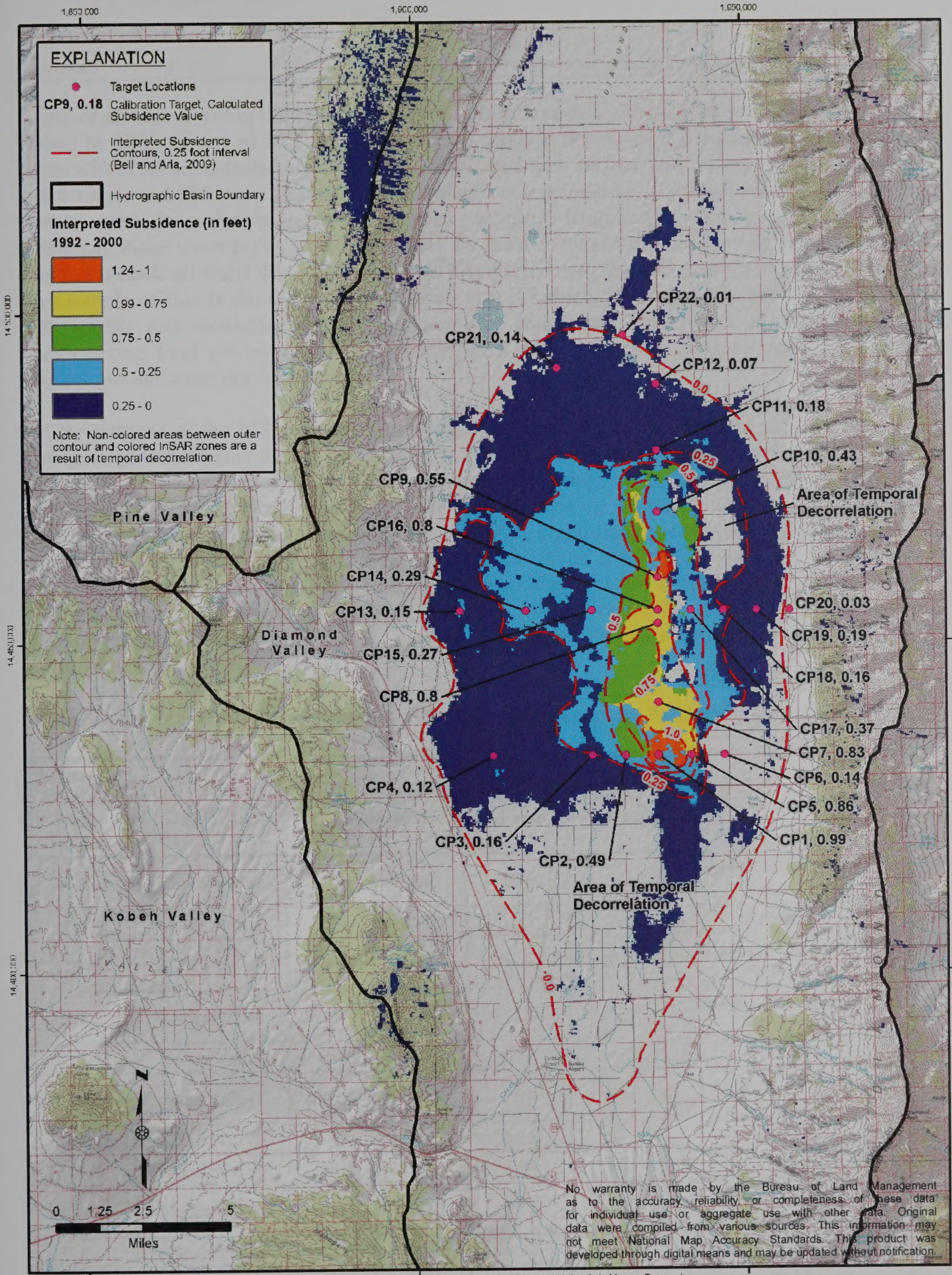
Based on the InSAR data analysis, at least 1.2 feet of land subsidence was estimated to have occurred in the south-central part of Diamond Valley between 1992 and 2000 (Figure 3.2.13). No measurable land subsidence was observed in Kobeh Valley during that time period (Montgomery et al. 2010).

The hydrogeological characteristics of Diamond and Kobeh Valleys are very similar (Harrill 1968; Tumbusch and Plume 2006). Both valleys contain thick (>3,000 feet) accumulations of basin-fill materials, much of which were derived from repeated cycles of lacustrine deposition during the late Cenozoic. It is reasonable, therefore, to expect that the aquifer system's response to pumping in Kobeh Valley would be similar to that observed in Diamond Valley in terms of land subsidence for a given amount of ground water drawdown.

3.2.2.7 Water Rights

In 1926, a carte blanche Public Water Reserve (PWR) was created through an EO by President Coolidge entitled "Public Water Reserves No. 107" (PWR 107). PWR 107 ended the site-specific system of reserving springs and water holes. The purpose of PWR 107 was to reserve natural springs and water holes yielding amounts in excess of homesteading requirements. This order states that "legal subdivision(s) of public land surveys which is vacant, unappropriated, unreserved public land and contains a spring or water hole, and all land within one quarter of a mile of every spring or water be reserved for public use". There was no intent to reserve the entire yield of each public spring or water hole, rather reserved water was limited to domestic human consumption and stockwatering. All waters from these sources in excess of the minimum amount necessary for these limited public watering purposes is available for appropriation through state water law. To date, many of these PWRs have not been registered with the state and/or are not adjudicated.

Water rights and applications for water rights were reviewed by Interflow and are summarized in Montgomery et al. (2010, Appendix C). These data were collected from the NDWR records in January 2010. The summary identified all water rights and applications for water rights for


1,850,000
1,900,000
1,950,000
14,500,000
14,450,000
14,400,000
EXPLANATION
Target Locations
CP9, 0.18 Calibration Target, Calculated Subsidence Value
Interpreted Subsidence Contours, 0.25 foot interval (Bell and Aria, 2009)
Hydrographic Basin Boundary
Interpreted Subsidence (in feet) 1992 - 2000
1.24 - 1
0.99 - 0.75
0.75 - 0.5
0.5 - 0.25
0.25 - 0
Note: Non-colored areas between outer contour and colored InSAR zones are a result of temporal decorrelation.
Pine Valley
Diamond Valley
Kobeh Valley
CP22, 0.01
CP21, 0.14
CP12, 0.07
CP11, 0.18
CP10, 0.43
Area of Temporal Decorrelation
CP9, 0.55
CP16, 0.8
CP14, 0.29
CP13, 0.15
CP20, 0.03
CP19, 0.19
CP15, 0.27
CP8, 0.8
CP18, 0.16
CP17, 0.37
CP7, 0.83
CP6, 0.14
CP4, 0.12
CP5, 0.86
CP1, 0.99
CP3, 0.16
CP2, 0.49
Area of Temporal Decorrelation
0.0
0.25
0.5
0.75
1.0
N
0 1.25 2.5 5
Miles

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BUREAU OF LAND MANAGEMENT

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Land Subsidence in Diamond Valley Interpreted From 1992-2000 InSAR Data

Figure 3.2.13

points of diversion within the HSA and within a 30-mile radius of Mount Hope, including those owned by EML or any of its subsidiaries. Of the 1,000 water rights and applications for water rights within the inventoried area, 472 were associated with surface water sources (e.g., streams and springs) and 528 were associated with underground sources (e.g., ground water wells). The primary uses for water in the area are stock watering, irrigation, mining and milling, and municipal. Since water rights are not necessary for most domestic wells in Nevada, this summary may not include all wells that exist within the inventoried area that are used for domestic water. An example of this is the domestic water well at the Roberts Creek Ranch. Additional vested water rights and subsisting rights for stockwater and future PWRs that are reserved for stockwatering (and domestic) purposes could exist within the Project Area and within the ten-foot ground water drawdown contour.

For the purpose of the EIS analysis, all underground water rights and pending applications for underground water rights owned by EML or its subsidiaries were excluded from the assessment of potential impacts; however, the actual streams and springs associated with any of EML's surface water features were not excluded. The boundary of the inventory area and locations of the points of diversion for the remaining (i.e., non-EML controlled) water rights and applications for water rights that were included in the assessment of potential impacts are shown in Figure 3.2.14; the owner, beneficial use, and annual duty for each water right are listed in Montgomery et al. (2010, Appendix C). Table 3.2-6 lists the non-EML controlled water rights and application for water rights that may be affected by Project activities, as discussed in Section 3.3.3.2.

Table 3.2-6: Non-EML Water Rights That May be Affected by Project Activities

Permit/ID Number/ Well Number	Basin	Source	Manner of Use	Duty (Af/Year)	Spring Number	Owner
2732	Kobeh Valley	STR	IRR	120.00	--	Etcheverry Family LTD Partnership
11188	Kobeh Valley	UG	STK	1.69	--	A C Florio
12748	Kobeh Valley	SPR	STK	10.86	721	Etcheverry Family LTD Partnership
16802	Kobeh Valley	STR[1]	IRR	117.00	--	Etcheverry Family LTD Partnership
43025	Kobeh Valley	UG	STK	5.16	--	BLM
43321	Pine Valley	SPR[2]	STK	7.24	--	Etcheverry Family LTD Partnership
44774	Kobeh Valley	UG	STK	6.51	--	BLM
44775	Kobeh Valley	UG	STK	5.77	--	BLM
48684	Kobeh Valley	UG	STK	8.68	--	Etcheverry Family LTD Partnership
71594	Kobeh Valley	UG	STK	0.00	--	Roy Risi
R06940	Diamond Valley	SPR	OTH	10.65	619	BLM
R06942	Pine Valley	SPR	OTH	10.65	597	BLM
R06944	Diamond Valley	SPR	OTH	10.65	612	BLM

Permit/ID Number/ Well Number	Basin	Source	Manner of Use	Duty (Af/Year)	Spring Number	Owner
R06951	Kobeh Valley	SPR	OTH	3.93	742	BLM
R06952	Kobeh Valley	UG[3]	OTH	3.93	--	BLM
V01953	Kobeh Valley	STR	IRR	350	--	Bernard Damele
V02781	Pine Valley	STR	IRR	112.33	--	Eureka Livestock Company
204*	Kobeh Valley	UG	STK	Unk	--	Unk
310*	Kobeh Valley	UG	STK	Unk	--	Unk

SPR=Spring, STR=Stream, STK=Stockwater, UG=Underground (well), IRR = Irrigation, OTH = Other (wildlife), Unk=Unknown

[1] - The water right is associated with Roberts Creek; however, NDWR identified the right as a spring in their database.

[2] - The water right is associated with a gravel pit that has water within the pit.

[3] - The water right is associated with a well; however, NDWR identified the right as a spring in their database.

* - Wells 204 and 310 appear to be used for stock watering and there are no water rights associated with these wells.

3.2.3 Environmental Consequences and Mitigation Measures

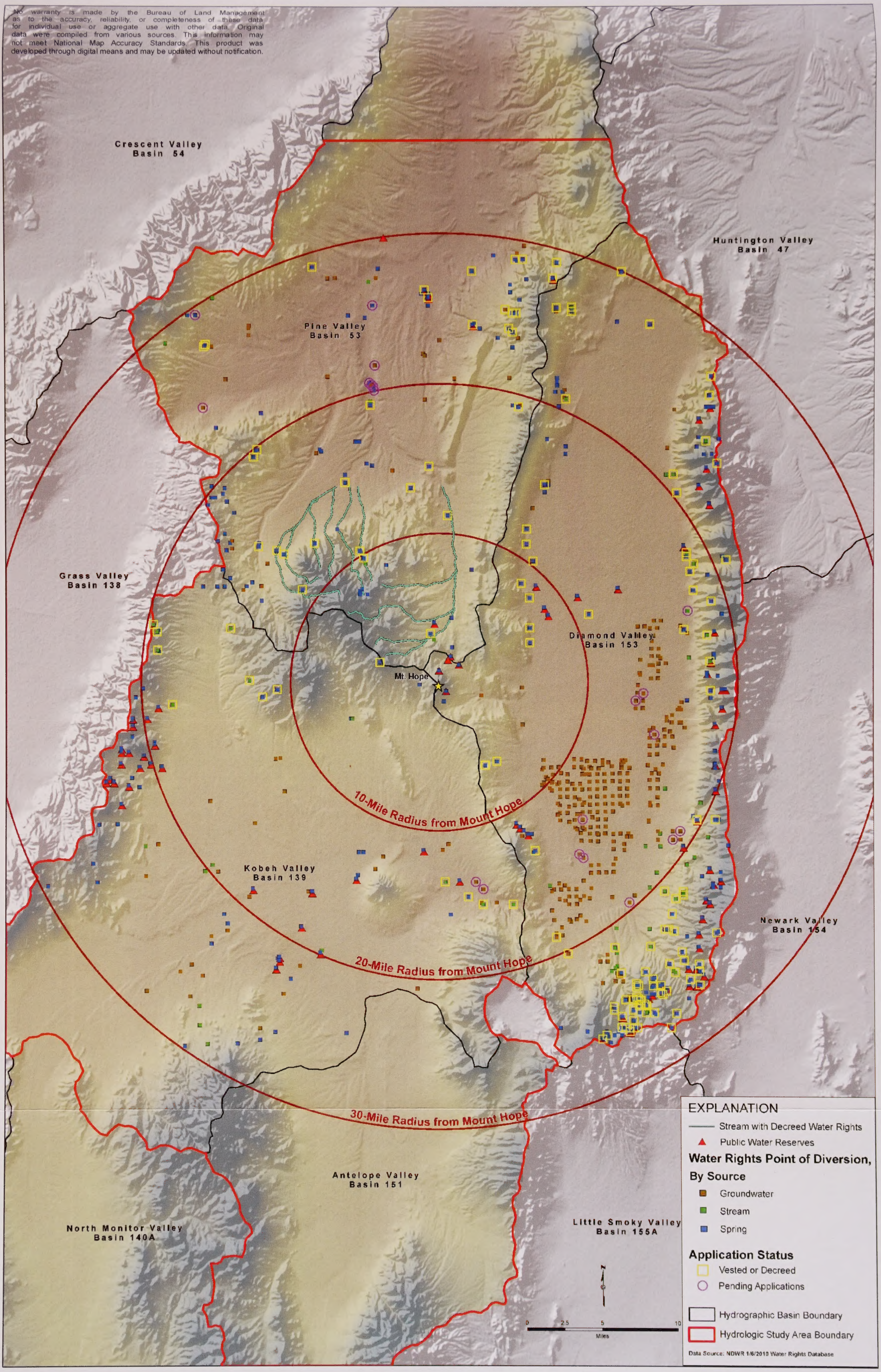
The Proposed Action and alternatives have the potential to impact surface water and ground water in the HSA. Potential water quantity impacts that may be associated with mining operations include the following: 1) reduction in surface and ground water quantity for current users and water-dependent resources from pit dewatering and production well withdrawals; 2) impacts from flooding, erosion, and sedimentation associated with mine construction, operation, and closure activities; and 3) changes in aquifer productivity or surficial drainage patterns or the creation of open fissures at the land surface related to dewatering-induced subsidence. The analysis of the magnitude and significance of these potential water resource impacts in relation to the Proposed Action and alternatives are addressed in this section. Potential water quality impacts are discussed in Section 3.3.3.

3.2.3.1 Significance Criteria

Criteria for assessing the significance of potential impacts to the quantity of water resources in the HSA are described below. Impacts to water resources are considered to be significant if any of these criteria are predicted to occur as a result of the Proposed Action or the alternatives.

3.2.3.1.1 Surface Water Quantity

- Modification or sedimentation of natural drainages resulting in increased area or incidence of flooding.
- Reduction in the flow of springs, seeps, or streams. Impacts are considered to be significant where the predicted ten-foot water table drawdown contour encompasses a spring, seep, or stream and where the surface water feature is determined to be hydraulically connected to the aquifer affected by drawdown.
- Diversion or consumptive use of ground water that adversely affects other (non-EML) water rights holders. This criterion includes flows to springs, seeps, or streams where existing beneficial water uses, as defined by state law, may be affected.


Crescent Valley Basin 54
Huntington Valley Basin 47
Pine Valley Basin 53
Grass Valley Basin 138
Diamond Valley Basin 153
Mt. Hope
10-Mile Radius from Mount Hope
Kobeh Valley Basin 139
Newark Valley Basin 154
20-Mile Radius from Mount Hope
30-Mile Radius from Mount Hope
Antelope Valley Basin 151
North Monitor Valley Basin 140A
Little Smoky Valley Basin 155A
N
0
2.5
5
10
Miles
EXPLANATION
Stream with Decreed Water Rights
Public Water Reserves
Water Rights Point of Diversion, By Source
Groundwater
Stream
Spring
Application Status
Vested or Decreed
Pending Applications
Hydrographic Basin Boundary
Hydrologic Study Area Boundary

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Data Source: NDWR 1/6/2010 Water Rights Database

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BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

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Non-EML-Controlled Water Rights and PWRs within HSA and 30-mile Radius of Mount Hope

Figure 3.2.14

3.2.3.1.2 Ground Water Quantity

- Reduction of ground water levels that adversely affect water-supply, municipal, domestic, agricultural, or industrial wells caused by Project dewatering or post-mining pit lake development. Impacts are considered to be significant where the predicted ten-foot water table drawdown contour encompasses an existing well with an active water right and the well is hydraulically connected to the aquifer affected by drawdown.
- A long-term consumptive use of a water resource that does not provide for a beneficial use.
- Lowering of ground water levels that result in substantial land subsidence. For the purposes of this EIS, significant impacts are indicated where hydraulic parameters of the aquifer are substantially changed (such that aquifer productivity may be affected), where differential subsidence results in open fissures at the land surface, or if subsidence is great enough to change drainage directions or cause ponding.

For this impact analysis, the area that is predicted to experience a decline in ground water elevation of ten feet or more as a result of mine dewatering and water production activities was selected as the area of **primary focus** regarding impacts to water resources. This is a commonly used approach for EISs in Nevada, in part because changes in ground water levels of less than ten feet generally are difficult to distinguish from natural seasonal and annual fluctuations in ground water levels.

3.2.3.2 Assessment Methodology

This section provides a summary of the methods used to evaluate the following: 1) the expected mine pit dewatering rates, 2) changes in ground water elevations and hydrographic basin water balances due to mining-related production well withdrawals and pit dewatering, and 3) the development and ultimate hydrologic conditions of the post-mining pit lake.

3.2.3.2.1 Numeric Ground Water Flow Modeling

A pair of nested three-dimensional numerical ground water flow models have been developed, calibrated, and utilized to estimate potential effects to ground water and surface water resources from the Proposed Action and No Action Alternative, and from the cumulative effects of historical dewatering and projected future dewatering and water production activities for this EIS. The nested models consist of a larger, regional-scale model (the Regional Model) that encompasses the entire HSA and a smaller, imbedded local-scale model (the Local Model) that is focused on the vicinity of the proposed open pit. The two models are "coupled" by representation of the same time-varying ground water stresses (boundary conditions) in both model domains. Interflow, Inc., prepared the Regional Model, and Montgomery & Associates, prepared the Local Model. A detailed explanation of the conceptual hydrogeologic model, numerical modeling approach and setup, steady-state and transient calibrations, sensitivity analyses, optimization, model coupling, and predictive usage of both the Regional and Local Models is presented in the technical report by Montgomery et al. (2010, Chapter 4). Additional supporting data, analysis, and documentation for the numerical models are presented in Bell (2008), Bell and Arai (2009), Interflow (2010), Montgomery & Associates (2010), and SRK (2008a).

Interflow and Montgomery & Associates conducted the ground water flow modeling using an enhanced version of the USGS numerical code MODFLOW (McDonald and Harbaugh 1984). The enhanced version, known as MODFLOW-SURFACT (HydroGeoLogic 1996), contains many improvements over MODFLOW, including more robust and accurate simulation capabilities for handling complex field conditions (such as large ground water elevation fluctuations, which result in drying and wetting of model grid cells). MODFLOW originally was designed to simulate flow through porous media. However, it is common practice for MODFLOW models to be used to simulate ground water flow in bedrock aquifers where flow through the rock mass is primarily controlled by interconnected fracture or solution networks that behave similarly to porous media flow at the scale of the model grid cells (D'Agnese et al. 1997; Prudic et al. 1995). MODFLOW packages that were utilized in this analysis include the Interbed-Storage Package (Leake and Prudic 1991) to evaluate subsidence effects of dewatering and the LAK2 Package (Council 1999) to evaluate filling of the pit lake after mining.

The Regional Model encompasses the entire HSA as shown in Figure 3.2.1. The Regional Model contains eight variable-thickness layers to simulate the vertical range extending from over 10,000 feet amsl at the peaks of some of the HSA's mountain ranges to zero feet amsl (mean sea level) at the base of the model. To provide better resolution where ground water stresses would be greatest, the model grid cell dimensions vary horizontally from 5,000 feet by 5,000 feet at the outer margins of the model to 1,000 feet by 1,000 feet in the vicinity of the proposed well field and open pit areas. The Regional Model was calibrated to include the following: 1) historic (circa 1955, presumed steady-state) water levels in each of the HSA basins, 2) the estimated agricultural pumping and observed changes in ground water levels in Diamond Valley between 1956 and 2006, and 3) the results of six aquifer pumping tests conducted in carbonate bedrock and basin-fill deposits in Kobeh Valley as part of the baseline studies for this EIS (Interflow 2010).

The Local Model domain is nested within the Regional Model and covers a rectangular area of approximately 28 square miles, which includes Mount Hope and extends roughly two miles to the north, west, and south and five miles to the east of the proposed open pit, as shown in Figure 3.2.1. The Local Model consists of 19 horizontal layers of different thickness spanning the vertical range from the top of Mount Hope (8,411 feet amsl) to zero feet amsl (mean sea level) at the base of the model. Horizontal grid cell dimensions range from 100 feet by 100 feet in the proposed open pit area to 800 feet by 800 feet along the edges of the Local Model. These refined grid cells in the Local Model, relative to the Regional Model, allow the Local Model to more accurately represent hydrologic features, such as fault zones and steep hydraulic gradients, well locations, open pit geometry, and ground water levels, in the proposed mining area. The Local Model was calibrated to observed 2009 water levels in the proposed open pit area, which were assumed to represent steady-state conditions, and to the measured transient responses to three aquifer pumping tests conducted in the open pit area dewatering test wells as part of the baseline studies for this EIS (Montgomery & Associates 2010).

Transient, predictive Regional and Local Model simulations were developed to assess the potential water quantity impacts of the Proposed Action, No Action Alternative, and cumulative effects of historic dewatering and projected future dewatering and water management activities. Potential water quantity impacts due to the Partial Backfill Alternative were evaluated in a modeling assessment using the same methodologies as used for the Proposed Action, except modifying those parameters that would reflect the backfilling of the open pit (Montgomery &

Associates 2011). The Off-Site Transfer of Ore Concentrate for Processing Alternative would require the same mining-related production well pumping, pit dewatering, and water production activities, and would result in the same development of the pit lake, as the Proposed Action; therefore, the potential water quantity impacts of the Off-Site Transfer of Ore Concentrate for Processing Alternative and the Proposed Action are considered to be the same. Potential water quantity impacts due to the Slower, Longer Project Alternative were evaluated in a modeling assessment using the same methodologies as used for the Proposed Action, except modifying those parameters that would reflect a doubling of the mining and pumping time frames and a one-half decrease in the production field pumping rate (Interflow 2011).

3.2.3.2.2 Modeling Scenarios

The calibrated Regional Model was used to simulate a "No Action Alternative Scenario" and a "Cumulative Action Scenario," both of which are identical for the historical time period from 1955 through 2009, but differ for the predictive time period beginning in 2010. The modeling assumptions regarding anthropogenic ground water withdrawals during the predictive time period for the two scenarios are summarized as follows:

No Action Alternative Scenario

The No Action Alternative Scenario includes all of the relevant existing ground water withdrawals within the HSA, as outlined below.

- Consumptive use of ground water for agricultural irrigation in Diamond Valley continues at 2009 rates (34,630 gpm or 55,850 afy) through 2106, and then is reduced by 60 percent (to 13,850 gpm or 22,340 afy) for the remainder of the simulated time period to constrain the drawdown to approximately 300 feet bgs (Figure 3.2.15). The modeling of the future agricultural consumptive use in Diamond Valley as a step function is a more conservative assumption than using a monotonically declining curve, in terms of water consumption. It is entirely possible that future ground water use could continue at rates similar to the present until the currently available water supply (in the upper part of the aquifer tapped by the agricultural wells) is depleted.

- Consumptive use of ground water for agricultural irrigation in Kobeh Valley continues at 2006 rates (1,800 gpm or 2,900 afy, at the Bobcat Ranch) through 2011 and then increases to 2,330 gpm (3,750 afy) at the Bobcat and 3F Ranches for the remainder of the simulated time period.

- Town of Eureka municipal water-supply pumping continues at 2006 rates (190 gpm or 300 afy) throughout the simulated time period.

- Consumptive use of ground water at the Ruby Hill Mine continues at 2006 rates (280 gpm or 450 afy) through 2012 and then ceases.

Cumulative Actions Scenario

The cumulative actions scenario includes all of the assumed consumptive uses listed above for the No Action Alternative Scenario plus the following ground water withdrawals related to the Proposed Action.

- Mine construction water supply is pumped from two wells in the proposed mining area at a combined rate of 300 gpm (480 afy) for one year (2011).
- Production well pumping for the proposed mining and milling operations in the Kobeh Valley Central Well Field (KVCWF) continue for 44 years; the amount of water extracted at the KVCWF varies yearly depending on the volume of water derived from open pit dewatering during mining, with the sum of the two water-supply sources equaling the total process-water demand of 7,000 gpm (11,300 afy) on an annualized average basis.
- Pit dewatering **would** continue **for** 32 years; **and** pit lake formation begins in **Year 32**.

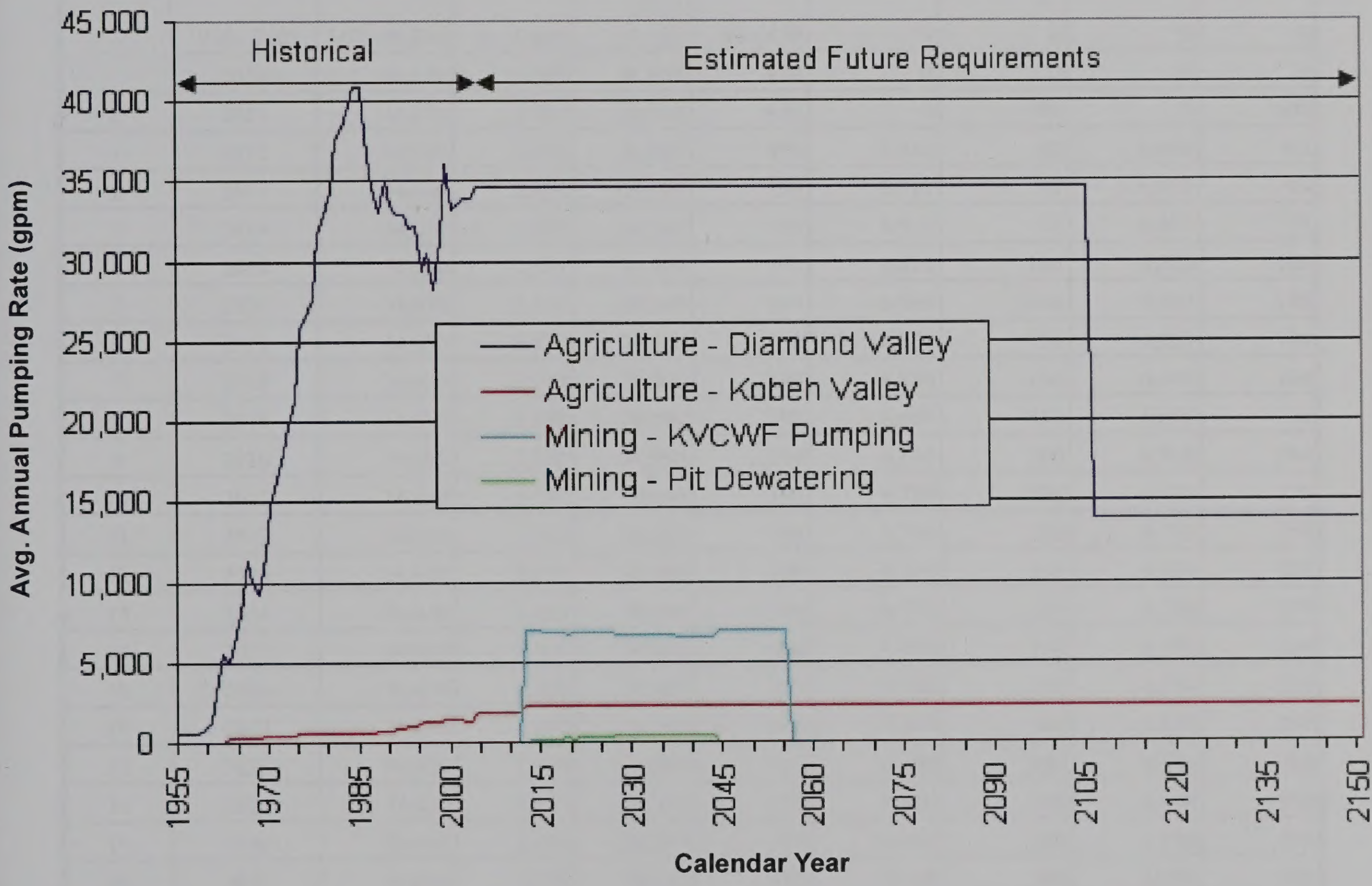
Historic pumping rates and projected future ground water withdrawals are summarized in Table 3.2-7 and shown on Figure 3.2.15.

The Local Model was coupled to the Regional Model simulation of the Cumulative Action Scenario for the predictive time period beginning in 2010. Lateral boundary conditions for the Local Model (specified hydraulic heads) were derived from the Regional Model via an iterative process that is explained in Montgomery et al. (2010). The Local Model was used to estimate the following:

- Passive ground water inflow rates to the mine open pit during the 32-year mining period;
- Pit lake formation (filling time, final lake stage) after dewatering ceases;
- The ground water inflow and outflow component(s) of the pit lake water balance;
- Whether the pit lake would act as a hydrologic sink for ground water or as a through-flow system; and
- Ground water stresses from open pit dewatering and pit lake development, which feed back into the Regional Model to complete the model coupling process.

3.2.3.2.3 Pit Dewatering and Water Supply Pumping

The open pit excavation is planned to commence late **in the construction phase**, with one year of pre-production followed by 32 years of production. Upon completion, the open pit would extend downward approximately 2,550 feet bgs and would cover an area of approximately 730 acres. Existing ground water levels near the center of the proposed open pit are approximately 300 feet bgs; therefore, a ground water drawdown of approximately 2,250 feet would be required during mining operations to lower the ground water level to below the ultimate open pit bottom. Inflowing ground water would be pumped from sumps in the pit and removed for consumptive use in the mining and milling process. The results of the numerical ground water modeling indicate that the open pit dewatering requirements under the Proposed Action (and the Partial Backfill Alternative and the Off-Site Transfer of Ore Concentrate for Processing Alternative) would range from approximately 60 to 460 gpm (100 to 750 afy) on an average annual basis, as listed in Table 3.2-7 and shown on Figure 3.2.15.



Note: Agricultural pumping is the annual net agricultural pumping, which is not the consumptive loss when referring to irrigation withdrawals.

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Historical Pumping and Estimated Future Pumping and Dewatering Requirements

Figure 3.2.15

Table 3.2-7: Summary of Historic Pumping and Estimated Future Pumping and Dewatering Requirements

Project Year	Calendar Year[1]	No Action Alternative				Proposed Action		Partial Backfill Alternative	
		Net Agricultural Pumping (gpm)[2]			Other[3] (gpm)	KVCWF Pumping (gpm)	Pit Inflow[4,5] (gpm)	KVCWF Pumping (gpm)	Pit Inflow[4] (gpm)
		Diamond Valley	Kobeh Valley	Total					
	1955	510	0	510	0	0	0	0	0
	1956 - 2009	510 - 40,830	0 - 1,800	510 - 41,450	70 - 470	0	0	0	0
	2010	34,630	1,780	36,410	470	0	0	0	0
0	2011	34,630	1,780	36,410	470	0	300	0	300
1	2012	34,630	2,330	36,960	470	6,940	60	6,940	60
2	2013	34,630	2,330	36,960	190	6,910	90	6,910	90
3	2014	34,630	2,330	36,960	190	6,930	70	6,930	70
4	2015	34,630	2,330	36,960	190	6,820	180	6,820	180
5	2016	34,630	2,330	36,960	190	6,860	140	6,860	140
6	2017	34,630	2,330	36,960	190	6,850	150	6,850	150
7	2018	34,630	2,330	36,960	190	6,840	160	6,840	160
8	2019	34,630	2,330	36,960	190	6,690	310	6,690	310
9	2020	34,630	2,330	36,960	190	6,800	200	6,800	200
10	2021	34,630	2,330	36,960	190	6,780	220	6,780	220
11	2022	34,630	2,330	36,960	190	6,750	250	6,750	250
12	2023	34,630	2,330	36,960	190	6,750	250	6,750	250
13	2024	34,630	2,330	36,960	190	6,750	250	6,750	250
14	2025	34,630	2,330	36,960	190	6,750	250	6,750	250
15	2026	34,630	2,330	36,960	190	6,750	250	6,750	250
16	2027	34,630	2,330	36,960	190	6,640	360	6,640	360
17	2028	34,630	2,330	36,960	190	6,640	360	6,640	360
18	2029	34,630	2,330	36,960	190	6,640	360	6,640	360
19	2030	34,630	2,330	36,960	190	6,640	360	6,640	360
20	2031	34,630	2,330	36,960	190	6,640	360	6,640	360
21	2032	34,630	2,330	36,960	190	6,610	390	6,610	390
22	2033	34,630	2,330	36,960	190	6,610	390	6,610	390
23	2034	34,630	2,330	36,960	190	6,610	390	6,610	390
24	2035	34,630	2,330	36,960	190	6,610	390	6,610	390
25	2036	34,630	2,330	36,960	190	6,610	390	6,610	390
26	2037	34,630	2,330	36,960	190	6,540	460	6,540	460
27	2038	34,630	2,330	36,960	190	6,540	460	6,540	460
28	2039	34,630	2,330	36,960	190	6,540	460	6,540	460
29	2040	34,630	2,330	36,960	190	6,540	460	6,540	460
30	2041	34,630	2,330	36,960	190	6,540	460	6,540	460
31	2042	34,630	2,330	36,960	190	6,580	420	6,580	420
32	2043	34,630	2,330	36,960	190	6,580	420	6,580	420
33	2044	34,630	2,330	36,960	190	7,000	180	7,000	0

Project Year	Calendar Year[1]	No Action Alternative				Proposed Action		Partial Backfill Alternative	
		Net Agricultural Pumping (gpm)[2]			Other[3] (gpm)	KVCWF Pumping (gpm)	Pit Inflow[4,5] (gpm)	KVCWF Pumping (gpm)	Pit Inflow[4] (gpm)
		Diamond Valley	Kobeh Valley	Total					
34	2045	34,630	2,330	36,960	190	7,000	180	7,000	0
35	2046	34,630	2,330	36,960	190	7,000	180	7,000	0
36	2047	34,630	2,330	36,960	190	7,000	170	7,000	0
37	2048	34,630	2,330	36,960	190	7,000	170	7,000	0
38	2049	34,630	2,330	36,960	190	7,000	170	7,000	0
39	2050	34,630	2,330	36,960	190	7,000	160	7,000	0
40	2051	34,630	2,330	36,960	190	7,000	160	7,000	0
41	2052	34,630	2,330	36,960	190	7,000	160	7,000	0
42	2053	34,630	2,330	36,960	190	7,000	160	7,000	0
43	2054	34,630	2,330	36,960	190	7,000	150	7,000	0
44	2055	34,630	2,330	36,960	190	7,000	150	7,000	0
	2056 - 2105	34,630	2,330	36,960	190	0	150 - 120	0	0
	2106 - end	13,850	2,330	16,180	190	0	120 - 60	0	0

[1] Calendar years used for numerical ground water flow model simulations; actual startup dates for the Proposed Action or Partial Backfill Alternative would depend on BLM and NDEP authorizations.

[2] Net agricultural pumping means net consumptive loss when referring to irrigation withdrawals. Average annual flow rate in gpm, rounded to nearest ten gpm.

[3] Includes Town of Eureka municipal water-supply pumping and Ruby Hill Mine pumping.

[4] Pit inflow value for Project Year Zero is local mine-area pumping for construction water.

[5] Pit inflow values after Project Year 32 are passive ground water inflows permanently lost to pit lake storage and/or evaporation from the lake's surface.

In addition to open pit dewatering, the Proposed Action (and the Partial Backfill Alternative and the Off-Site Transfer of Ore Concentrate for Processing Alternative) would also involve pumping from the KVCWF for mining and milling water supply starting in 2012 and continuing for 44 years. The water-supply pumping was simulated from ten wells located along the well field corridor in central Kobeh Valley, as shown in Figure 3.2.1. Approximately ten percent of the total well field production was withdrawn from simulated wells in carbonate bedrock, whereas the remaining 90 percent was withdrawn from simulated wells in the basin-fill aquifer (Montgomery et al. 2010). The simulated KVCWF total production during the planned 44 years of operation ranged from 6,540 to 7,000 gpm (10,550 to 11,300 afy) on an average annual basis, as listed in Table 3.2-7 and shown on Figure 3.2.15.

The assessment of cumulative impacts associated with the proposed mine dewatering and KVCWF pumping include an evaluation of the total drawdown from all past, present, and reasonably foreseeable future mine dewatering, production well pumping, and other withdrawals of ground water for consumptive use. This includes the following: 1) historic pumping for agricultural irrigation in Diamond and Kobeh Valleys and continuing through the present; 2) projected future ground water withdrawals for agricultural irrigation, municipal water supply and mining and milling uses by other mines within the HSA; and 3) projected future dewatering and KVCWF pumping requirements for the Proposed Action.

3.2.3.2.4 Evaluation of Impacts to Ground Water Levels

The method used for calculating ground water drawdown for the Proposed Action, No Action Alternative, and cumulative effects assessment are described in detail in Montgomery et al. (2010). Briefly, the predicted water-table drawdown for the No Action Alternative was calculated by subtracting the No Action Alternative Scenario predicted water-level elevations at a certain time in the future (approximately 2055) from the simulated water-level elevations at the end of 2009 (Figure 3.2.16), thus illustrating only the predicted future drawdown relative to existing conditions. The predicted water-table drawdown for the cumulative effects assessment was calculated by subtracting the Cumulative Action Scenario predicted water-level elevations at a certain time in the future from the simulated water-level elevations in 1955, thus relating the simulated historic drawdown and the predicted future drawdown to pre-development conditions (Figure 3.2.11). The predicted water-table drawdown for the Proposed Action was calculated by subtracting the simulated No Action Alternative Scenario water-level elevations from the Cumulative Action Scenario water level elevations at the same point(s) in time in the future. By using this methodology, the predicted results for the Proposed Action do not include the simulated changes to ground water elevations that have occurred in the HSA due to the historic pumping and ground water consumption that occurred between 1955 and the end of 2009, which are shown in Figure 3.2.17. Hence, the baseline condition used as the reference for comparison of the Proposed Action and the alternatives is the simulated existing ground water elevations at the end of 2009, whereas for the cumulative analysis the baseline condition is the estimated pre-development steady-state ground water elevations that existed in 1955.

A ten-foot drawdown contour has been used in the analysis as the reference point for determining potential impacts. The use of a numeric flow model to project potential drawdown at magnitudes of less than approximately ten percent of the local magnitude of drawdown becomes progressively uncertain as the threshold for drawdown prediction decreases. While the numeric model produces values of drawdown to small fractions of a foot, extrapolated over vast distances (the entire model domain), the numbers at this level of precision become an artifact of numeric processes rather than a representation of a physical reality. This is due to physical and mathematical simplifications necessary to model the regional flow system. While there is no standardized way of determining a reporting threshold, the value of ten feet is believed to be commensurate with the predictive qualities and uncertainties associated with this particular model. It is acknowledged that lesser degrees of drawdown can have impacts, however, modeling in this complex geologic setting has its limitations, and to report modeling results to very small thresholds would project a false level of model utility.

In addition, the magnitude, timing, and areal extent of drawdown was evaluated by analyzing the model simulation results at eight selected time intervals that represent the projected conditions at the end of the proposed mining/milling operations (in 2055) and at ten, 30, 50, 100, 200, 300, and 400 years after KVCWF pumping ceases under the Proposed Action.

3.2.3.3 Proposed Action

3.2.3.3.1 Surface Water Resources

Erosion, Sedimentation, and Flooding within Drainages

The Project would require the alteration or diversion of existing natural drainages and washes that contain surface flow during the infrequent periods of high rainfall and snowmelt from the Roberts Mountains and at Mount Hope. All of the planned storm water diversion structures are designed to carry estimated peak flows of a 100-year, 24-hour storm event, with additional capacity to safely pass the inflow design flood peak flow during operations and at closure.

Surface disturbance generally causes an increase in erosion. Therefore, sediment from increased erosion may be transported to and accumulate in the local surface drainages. During mine operation, standard erosion prevention and maintenance procedures (see Section 2.1.7.4) would reduce impacts to less than significant levels.

Small drainages affected by roads and small facility structures would be returned to their natural condition during reclamation. Permanent drainage alterations around the open pit, TSFs, and WRDFs would consist of open channels and berms. Such features would be left in place and reclaimed using revegetation or rock lining for stability and elimination of long-term maintenance under post-closure conditions.

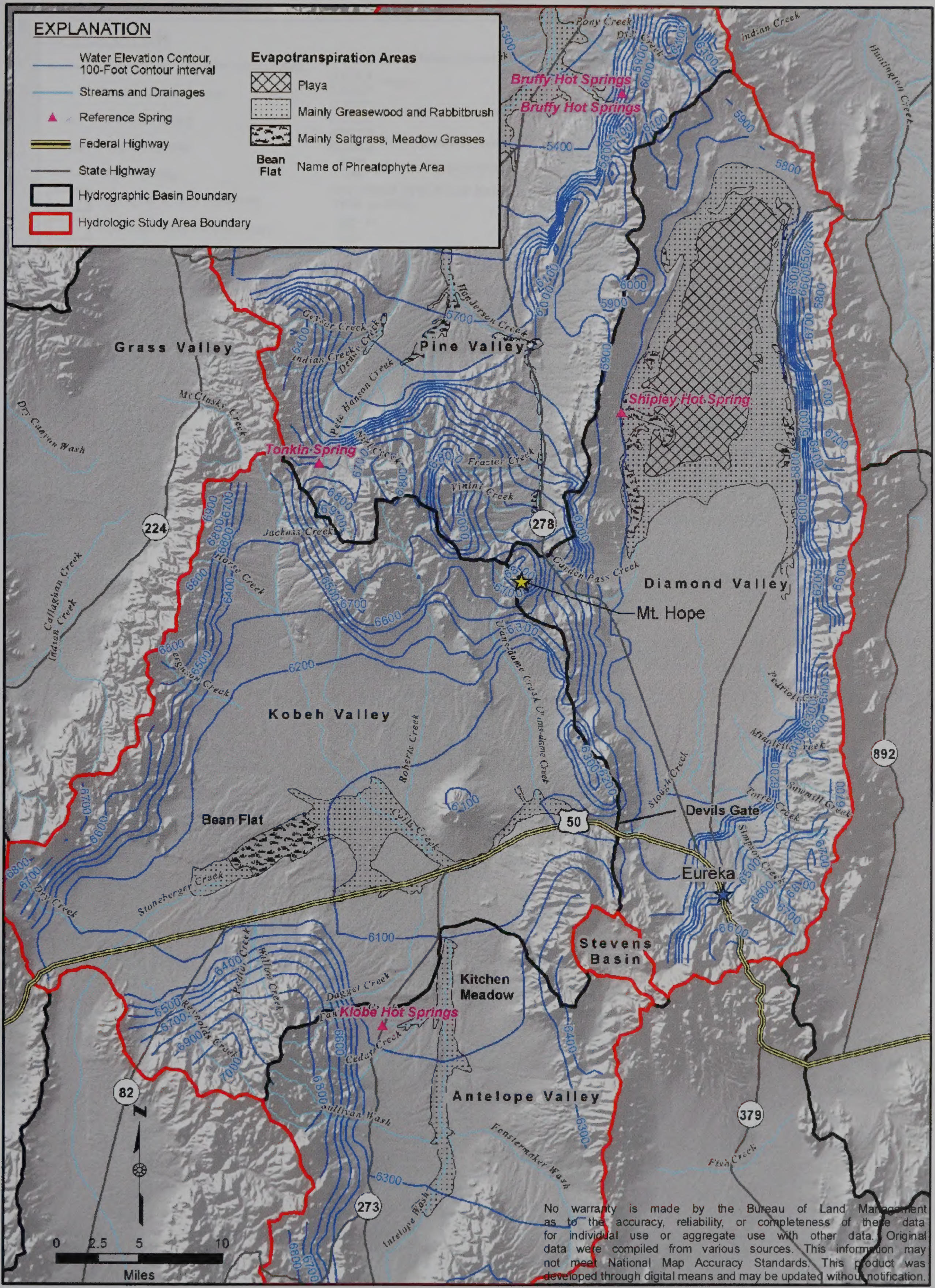
- **Impact 3.2.3.3-1:** Grading, earth moving, diversion of drainages, and placement of fill could accelerate erosion and sedimentation, and alter surface water flood runoff patterns during mining and post-closure.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Effects of Ground Water Drawdown on Streams, Springs, and Surface Water Resources

Dewatering would be required in the open pit during the mining phase of the Project. The open pit dewatering would be achieved with in-pit sumps and, if necessary, horizontal drains and perimeter wells would also be used. The average pit inflow rate is estimated to range between 60 to 460 gpm (100 to 750 afy), commencing in Year 1 of the Project and continuing through Year 32, as shown in Table 3.2-7. In addition, ground water pumping in the KVCWF area for process-water supply would be achieved with high capacity production wells completed in the basin-fill and carbonate bedrock aquifers. The average total combined pumping rate of the well field is estimated to range between 6,540 to 7,000 gpm (10,550 to 11,300 afy), commencing in Year 1 of the Project (2012) and continuing through Year 44 (2055), as shown in Table 3.2-7. The open pit dewatering activities and KVCWF pumping would lower (draw down) the water table in the vicinity of those facilities. The predicted maximum drawdown in the bedrock of the open pit area is approximately 2,250 feet, whereas in central Kobeh Valley, the predicted maximum drawdown is approximately 120 feet near the center of the well field after 44 years of


EXPLANATION
Water Elevation Contour, 100-Foot Contour interval
Streams and Drainages
Reference Spring
Federal Highway
State Highway
Hydrographic Basin Boundary
Hydrologic Study Area Boundary
Evapotranspiration Areas
Playa
Mainly Greasewood and Rabbitbrush
Mainly Saltgrass, Meadow Grasses
Bean Flat
Name of Phreatophyte Area
Pony Creek
Dry Creek
Indian Creek
Huntington Creek
Bruffy Hot Springs
Bruffy Hot Springs
Henderson Creek
Geyser Creek
Indian Creek
Denay Creek
Pete Hanson Creek
Grass Valley
Pine Valley
McClusky Creek
Dry Canyon Wash
Shipley Hot Spring
Tonkin Spring
Nigel Creek
Frazier Creek
Vinini Creek
Jackass Creek
224
278
Garden Pass Creek
Diamond Valley
Horse Creek
Mt. Hope
Callaghan Creek
Indian Creek
Ferguson Creek
Roberts Creek
Kobeh Valley
Pedrioli Creek
Windfall Creek
Sawmill Creek
Torre Creek
Slough Creek
Devils Gate
892
Bean Flat
50
Coils Creek
Simpson Creek
Eureka
Stoneberger Creek
Dry Creek
Stevens Basin
Kitchen Meadow
Dugget Creek
Pedro Creek
Willow Creek
Reynolds Creek
Klobe Hot Springs
Cedar Creek
Antelope Valley
Sullivan Wash
Fenstermaker Wash
Antelope Wash
82
379
273
Fish Creek
N
0 2.5 5 10
Miles
5300
5400
5800
5900
6000
6100
6200
6300
6400
6500
6600
6700
6800
6900
7000

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Source: Montgomery et al. (2010).

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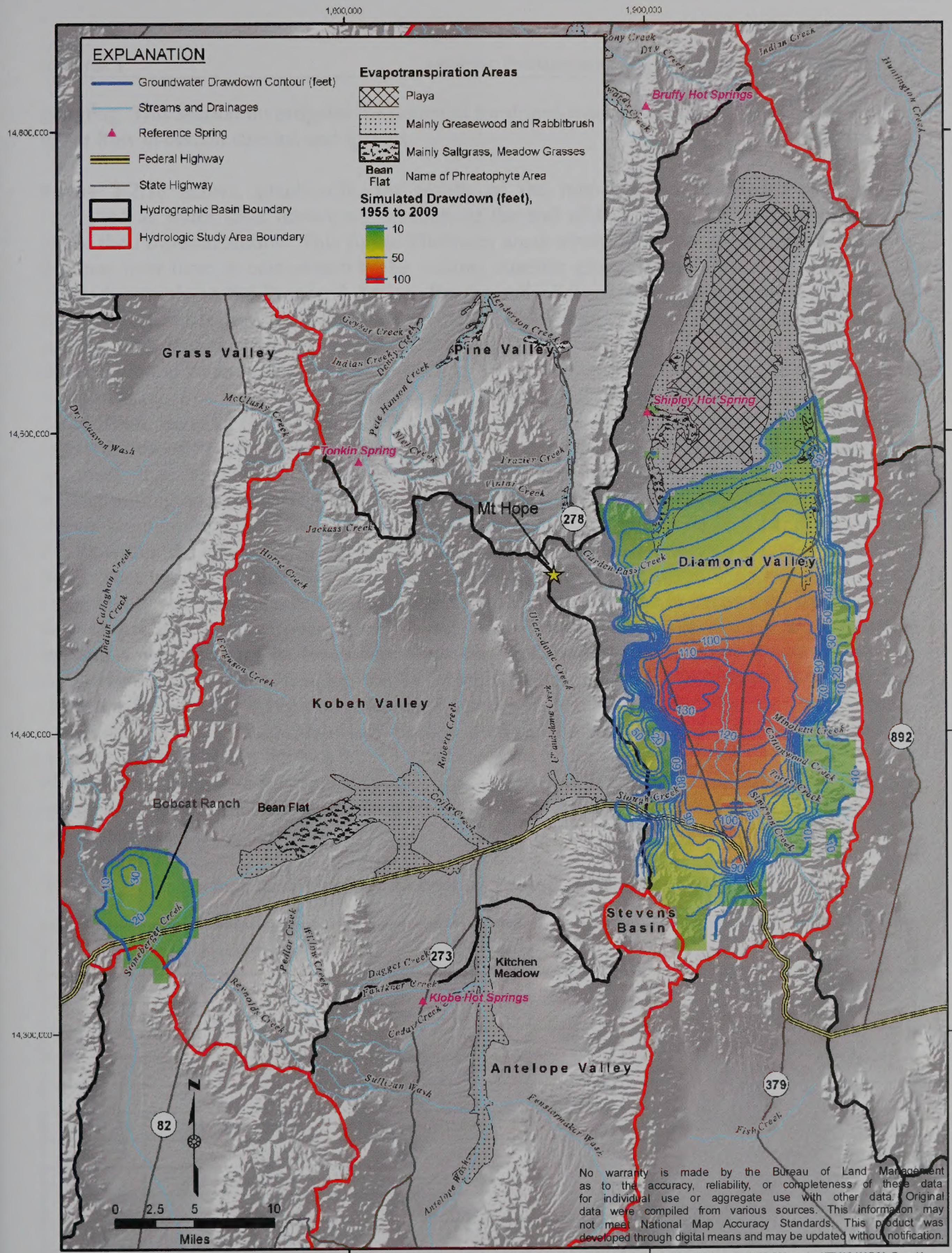
Simulated Ground Water Elevations in 2009

Figure 3.2.16


1,800,000
1,900,000
14,600,000
14,500,000
14,400,000
14,300,000
EXPLANATION
Groundwater Drawdown Contour (feet)
Streams and Drainages
Reference Spring
Federal Highway
State Highway
Hydrographic Basin Boundary
Hydrologic Study Area Boundary
Evapotranspiration Areas
Playa
Mainly Greasewood and Rabbitbrush
Mainly Saltgrass, Meadow Grasses
Bean Flat
Name of Phreatophyte Area
Simulated Drawdown (feet), 1955 to 2009
10
50
100
Bruffy Hot Springs
Shipley Hot Spring
Tonkin Spring
Klobe Hot Springs
Grass Valley
Pine Valley
Diamond Valley
Kobeh Valley
Antelope Valley
Stevens Basin
Bobcat Ranch
Bean Flat
Kitchen Meadow
Mt Hope
Pony Creek
Dry Creek
Indian Creek
Huntington Creek
Geyser Creek
Indian Creek
Denay Creek
Henderson Creek
Pete Hanson Creek
McClusky Creek
Dry Canyon Wash
Nigel Creek
Frazier Creek
Vinini Creek
Jackass Creek
Garden Pass Creek
Horse Creek
Callaghan Creek
Indian Creek
Ferguson Creek
Roberts Creek
Un-and-dame Creek
Coils Creek
Slough Creek
Minoletti Creek
Cottonwood Creek
Tonte Creek
Simpson Creek
Stoneberger Creek
Peillar Creek
Willow Creek
Dugget Creek
Faulkner Creek
Reynolds Creek
Cedar Creek
Sullivan Wash
Fenstermaker Wash
Antelope Wash
Fish Creek
278
892
273
82
379
10
20
30
40
50
60
80
90
100
110
120
130
N
0
2.5
5
10
Miles

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MOUNT HOPE PROJECT

DRAWING TITLE:

Simulated Water Table Drawdown in 2009, Relative to Pre-Development Conditions (circa 1955)

Figure 3.2.17

pumping. This section investigates the potential for drawdown of the water table to affect surface water flow in certain streams and springs.

Figure 3.2.18 shows, graphically, the results of the numerical ground water flow model expressed as water table drawdown contours at the end of the mining and milling operations under the Proposed Action. This figure illustrates areas where the water levels are predicted to decrease over time, in comparison to the existing baseline ground water elevations at the end of 2009, due solely to the Proposed Action. By the end of the mining and milling operations (in 2055), two distinct drawdown areas are predicted to develop: one area centered on the open pit and the other area surrounding the KVCWF wells. These ground water modeling results indicate that the ground water would be drawn down by more than ten feet at 12 spring locations and at one perennial stream segment (Roberts Creek) at the end of the mining and milling operations. **In addition, three of these springs (619, 639, and 646) would also be directly affected by the construction of Project components.** The ground water level is not expected to be drawn down by more than ten feet at any other spring or perennial stream segment at the end of mining/milling operations. Ten of the potentially affected springs (Table 3.2-8) and the perennial stream segments appear to be associated with water rights, as listed in Table 3.2-6. There are no PWRs within the ten-foot drawdown. In addition, springs that have not been identified as having PWRs, but may have sufficient flows (1,800 **gallons per day** [gpd]) to support a PWR claim could be affected. **Impacts to surface water resources could occur in areas with less than ten feet of predicted drawdown. The ground water modeling is less precise at predicting ground water changes at levels less than ten feet, particular in areas distant from the pumping sources, as such, using the hydrologic model to predict drawdown to a level less than ten feet does not represent the best science.** It should be noted that the plotted spring locations in Figure 3.2.18 and other figures showing drawdown were obtained from various sources, as described in Section 3.2.2.3.2, whereas the water rights locations were derived from NDWR files. Both data sets appear on the figures; however, it should be understood that a single spring may be represented by more than one point; its actual location and in addition one or more associated water rights locations.

Table 3.2-8: Springs that May be Affected by Project Activities

Spring Number	Spring Name	Basin	Flow (gpm)	Use
578	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses
583	Unnamed Spring	Pine Valley	--	Livestock, Wildlife, and Wild Horses
587	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses
592	Unnamed Spring (OT-2)*	Pine Valley	9.03	Livestock, Wildlife, and Wild Horses
597	Garden Spring	Pine Valley	<0.1	Livestock, Wildlife, and Wild Horses
600	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses
601	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses
604	Unnamed Spring	Diamond Valley	<0.1	Livestock, Wildlife, and Wild Horses
605	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses
608	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses
609	Unnamed Spring (OT-5)*	Pine Valley	--	Livestock, Wildlife, and Wild Horses
610	Unnamed Spring (OT-3)*	Pine Valley	1.53	Livestock, Wildlife, and Wild Horses
612	McBrides Spring*	Diamond Valley	1.8	Livestock, Wildlife, and Wild Horses

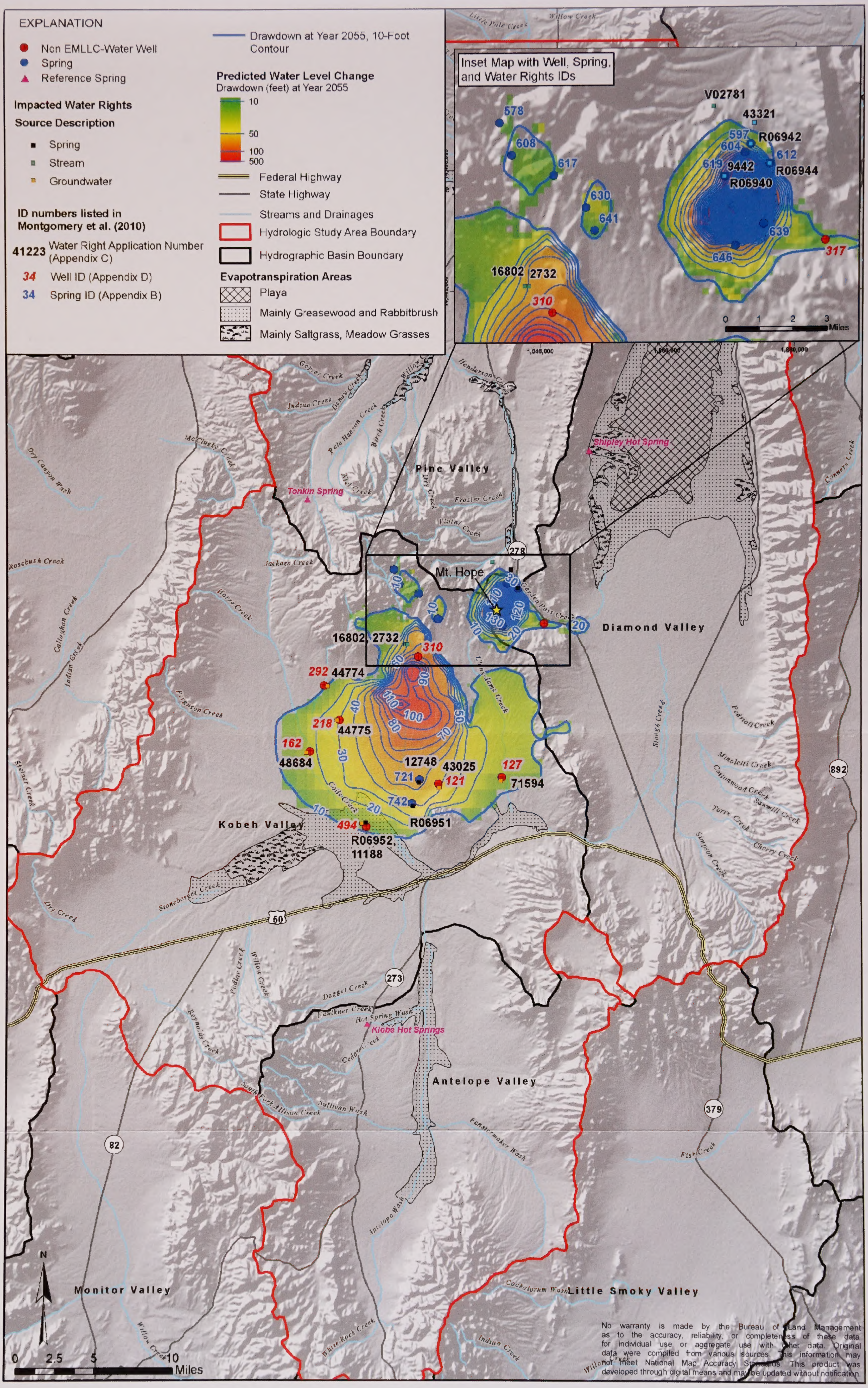
Spring Number	Spring Name	Basin	Flow (gpm)	Use
617	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses
619	Mount Hope Spring*	Diamond Valley	0.03	Livestock, Wildlife, and Wild Horses
630	Unnamed Spring (OT-8)*	Kobeh Valley	6.97	Livestock, Wildlife, and Wild Horses
634	Farrington Spring	Kobeh Valley	<1	Livestock, Wildlife, and Wild Horses
639	Zinc Adit	Diamond Valley	8	Livestock, Wildlife, and Wild Horses
641	Unnamed Spring (OT-7)*	Kobeh Valley	2.36	Livestock, Wildlife, and Wild Horses
646	Unnamed Spring (SP-7)	Diamond Valley	--	Livestock, Wildlife, and Wild Horses
721	Mud Spring*	Kobeh Valley	<1	Livestock, Wildlife, and Wild Horses
742	Lone Mountain Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses

*** Indicates a spring that is likely to be perennial.**

After dewatering ceases, the ground water would begin to recover in the open pit area. Similarly, ground water in the basin-fill and bedrock aquifers of Kobeh Valley would begin to recover when **production water** pumping in the KVCWF ceases **(Year 42)**. The limits of ground water drawdown surrounding the open pit and KVCWF would continue to expand in the perimeter areas after open pit dewatering and production well pumping cease, as the open pit and dewatered portions of the aquifers fill with ground water that is derived from storage as well as natural recharge. Due to aquifer geometry and heterogeneity, the rate and ultimate extent of continued lateral expansion of drawdown would not be the same in all directions. Figure 3.2.19 shows the simulated ten-foot water table drawdown contours at ten, 50, 100, 150, 200, 250, 300, 350, and 400 years of post-Project recovery, and illustrates the composite maximum-extent-of-drawdown used in this analysis. The boundary of the maximum-extent-of-drawdown encompasses all of the areas that are predicted to experience more than ten feet of drawdown at any time in the future due to the Proposed Action. In the vicinity of Mount Hope, the maximum extent of the ten-foot drawdown contour is approximately one mile beyond its location at the end of the mining and milling operations, whereas for the area surrounding the KVCWF, the difference generally is much less (on the order of 0.1 mile) beyond the ten-foot drawdown contour at the end of active pumping.

The maximum extent of the ten-foot drawdown contour encompasses 22 springs, two perennial stream segments (Roberts Creek and Henderson Creek), and portions of four intermittent and ephemeral stream drainages (Coils Creek, Rutabaga Creek, U'ans-in-dame Creek, and Garden Pass Creek), as shown in Figure 3.2.20. As discussed in Section 3.2.2.3.1, the stream reaches and springs located in this area can be characterized as either intermittent, ephemeral, or perennial. Intermittent and ephemeral stream reaches and spring sites flow only during or after wet periods in response to rainfall or snowmelt runoff events. By definition, these surface waters are not controlled by discharge from the regional ground water system. During the low flow period of the year (late summer through fall), intermittent and ephemeral stream reaches and springs typically would be dry.

In contrast, perennial stream segments and springs generally flow throughout the year. Flows observed during the wet periods, which typically extend from spring through early summer, include a combination of surface runoff and ground water discharge, whereas flows observed during the low-flow period are sustained entirely by discharge from the ground water system. If the flow in these stream segments and springs relies on the aquifer that is being dewatered, a


EXPLANATION
● Non EMLLC-Water Well
● Spring
▲ Reference Spring
Impacted Water Rights
Source Description
■ Spring
■ Stream
■ Groundwater
ID numbers listed in Montgomery et al. (2010)
41223 Water Right Application Number (Appendix C)
34 Well ID (Appendix D)
34 Spring ID (Appendix B)
Drawdown at Year 2055, 10-Foot Contour
Predicted Water Level Change
Drawdown (feet) at Year 2055
10
50
100
500
Federal Highway
State Highway
Streams and Drainages
Hydrologic Study Area Boundary
Hydrographic Basin Boundary
Evapotranspiration Areas
▨ Playa
Mainly Greasewood and Rabbitbrush
Mainly Saltgrass, Meadow Grasses
Inset Map with Well, Spring, and Water Rights IDs
V02781
43321
578
608
617
630
641
597
604
619
9442
612
R06942
R06944
R06940
639
646
317
16802
2732
310
0 1 2 3 Miles
1,840,000
1,860,000
1,880,000
Little Pole Creek
Willow Creek
Geyser Creek
Indian Creek
Dobby Creek
Willow
Henderson Creek
McClusky Creek
Pete Hanson Creek
Birch Creek
Dry Canyon Wash
Tonkin Spring
Pine Valley
Shipley Hot Spring
Nell Creek
Dry Creek
Frazier Creek
Vinini Creek
Conners Creek
Rosebush Creek
Jackass Creek
Mt. Hope
278
Hope Creek
Garden Pass Creek
Diamond Valley
Callaghan Creek
Indian Creek
Ferguson Creek
Henderson Creek
Slough Creek
Pedroli Creek
Steiner Creek
Minoletti Creek
Cottonwood Creek
Sawmill Creek
Torre Creek
Simpson Creek
Cherry Creek
892
16802, 2732
310
292
44774
218
44775
162
48684
12748
43025
721
121
127
71594
742
R06951
494
R06952, 11188
Kobeh Valley
Coils Creek
10
20
30
40
50
60
70
80
90
100
110
120
130
Stoneberger Creek
Dry Creek
50
273
Pablos Creek
Willow Creek
Dagget Creek
Faulkner Creek
Hot Spring Wash
Klobe Hot Springs
Reynolds Creek
Cedar Creek
South Fork Allison Creek
Sullivan Wash
Antelope Valley
Fenstermaker Wash
379
82
Fish Creek
Antelope Wash
N
Monitor Valley
Cockalorum Wash
Little Smoky Valley
Willow Creek
White Rock Creek
Indian Creek
Willow Creek
0 2.5 5 10 Miles

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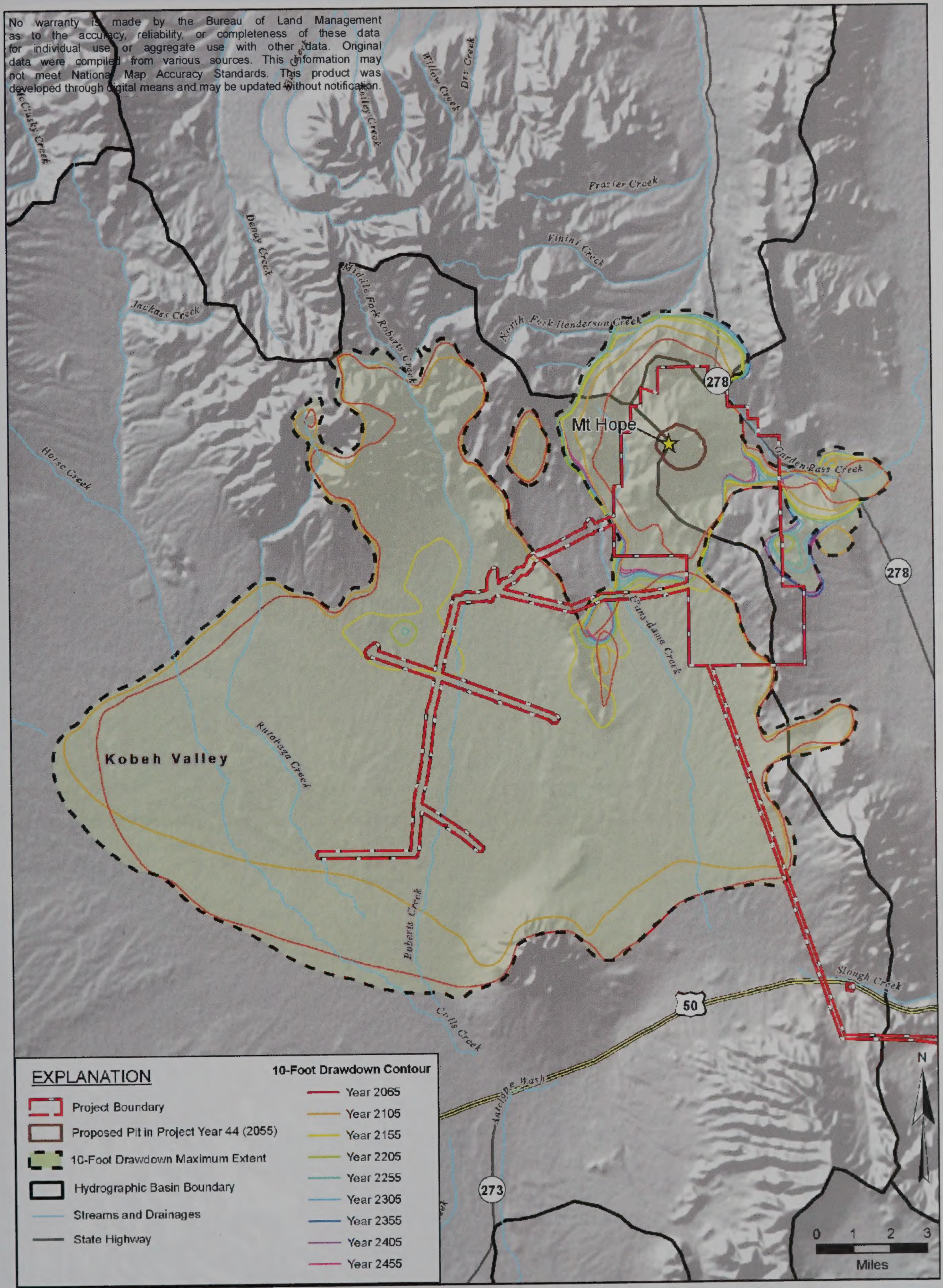
BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Proposed Action Simulated Ground Water-Level Change in Year 2055, Relative to 2009 Conditions

Figure 3.2.18.



Willow Creek
Dry Creek
Bailey Creek
McClusky Creek
Frazier Creek
Vinini Creek
Denay Creek
Middle Fork Roberts Creek
Jackass Creek
North Fork Henderson Creek
278
Mt Hope
Garden Pass Creek
Horse Creek
278
Coils-dame Creek
Kobeh Valley
Rutabaga Creek
Roberts Creek
Slough Creek
50
Coils Creek
Antelope Wash
273
N
0
1
2
3
Miles
EXPLANATION
Project Boundary
Proposed Pit in Project Year 44 (2055)
10-Foot Drawdown Maximum Extent
Hydrographic Basin Boundary
Streams and Drainages
State Highway
10-Foot Drawdown Contour
Year 2065
Year 2105
Year 2155
Year 2205
Year 2255
Year 2305
Year 2355
Year 2405
Year 2455

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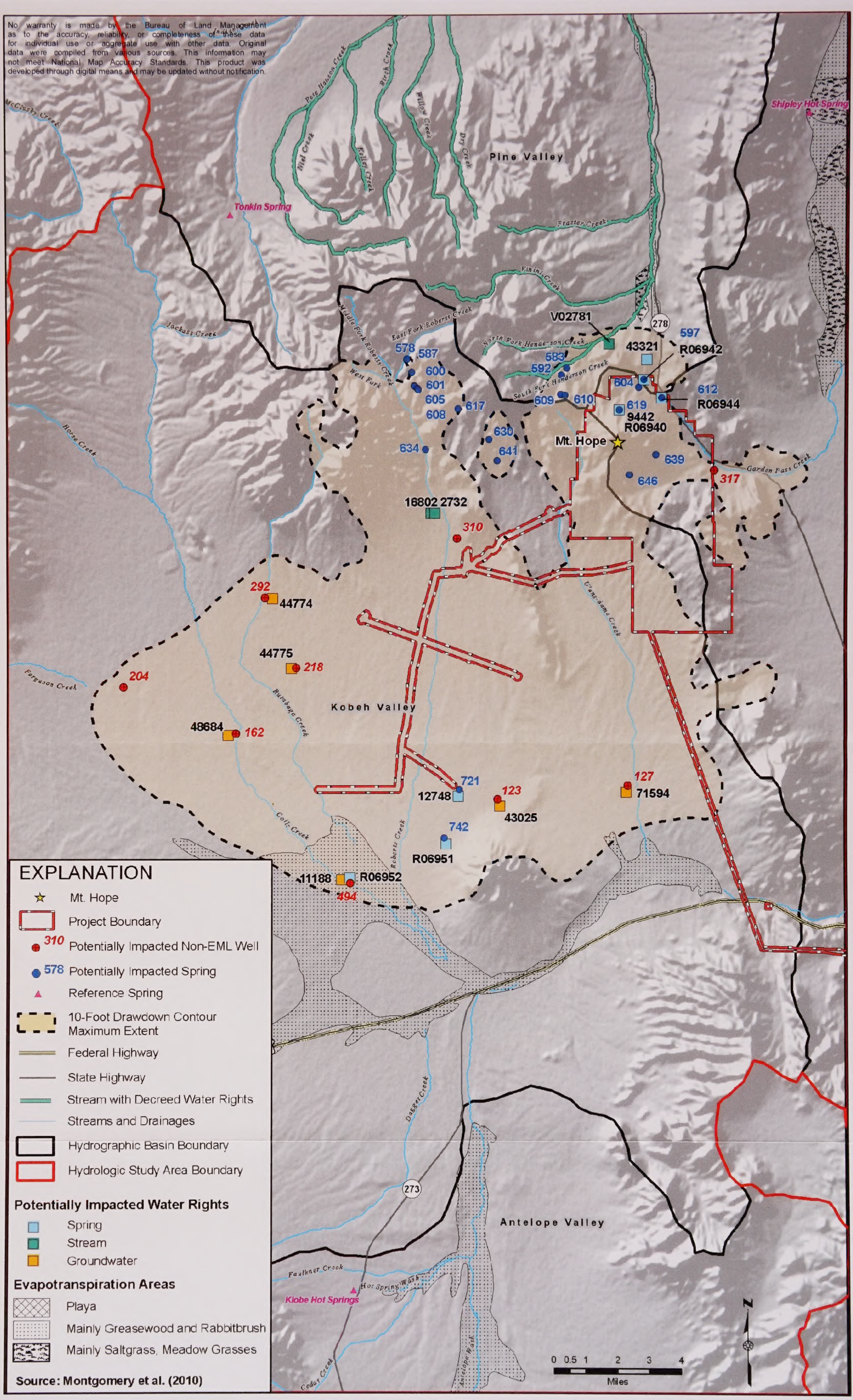
BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Proposed Action Simulated Ten-Foot Water Table Drawdown Contours During 400 Years of Post-Mining Recovery

Figure 3.2.19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McClusky Creek
Pete Hanson Creek
Birch Creek
Henderson Creek
Hunt Creek
Willow Creek
Kelly Creek
Dry Creek
Pine Valley
Shipley Hot Spring
Tonkin Spring
Frazier Creek
Vinini Creek
Jackass Creek
East Fork Roberts Creek
Middle Fork Roberts Creek
West Fork
North Fork Henderson Creek
South Fork Henderson Creek
278
V02781
43321
597
R06942
578
587
583
592
600
601
605
608
617
604
612
R06944
609
610
619
9442
R06940
630
641
634
Mt. Hope
639
646
Garden Pass Creek
317
Horse Creek
16802 2732
310
Tyrone Creek
292
44774
44775
218
204
Ferguson Creek
Kobeh Valley
Bullhead Creek
48684
162
721
12748
123
43025
127
71594
742
R06951
Coils Creek
Roberts Creek
11188
R06952
494
EXPLANATION
☆ Mt. Hope
Project Boundary
310 Potentially Impacted Non-EML Well
578 Potentially Impacted Spring
Reference Spring
10-Foot Drawdown Contour Maximum Extent
Federal Highway
State Highway
Stream with Decreed Water Rights
Streams and Drainages
Hydrographic Basin Boundary
Hydrologic Study Area Boundary
Potentially Impacted Water Rights
Spring
Stream
Groundwater
Evapotranspiration Areas
Playa
Mainly Greasewood and Rabbitbrush
Mainly Saltgrass, Meadow Grasses
Source: Montgomery et al. (2010)
Dagget Creek
273
Antelope Valley
Faulkner Creek
Hot Spring Wash
Klobe Hot Springs
Cedar Creek
Antelope Wash
N
0 0.5 1 2 3 4
Miles

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BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Water Rights within the Proposed Action Simulated Maximum Extent of Ten-Foot Water Table Drawdown

Figure 3.2.20

reduction of ground water levels from mine-induced drawdown could reduce the ground water discharge to perennial stream segments or springs. The Pete Hanson Decree adjudicates all stream waters tributary to both Pete Hanson and Henderson Creek. The decree grants water rights subject to restrictions on points of diversion, season of use, and total duty. **Additional surface water resources that are covered by water rights, and not subject to the Pete Hanson Decree, include Roberts Creek and springs in Kobeh Valley.** Potential adverse effects to water rights from the Project would be mitigated **under** NDWR jurisdiction. **The BLM would not address or mitigate impacts to water rights.**

Of the 22 potentially impacted springs, six appear to be associated with water rights (Table 3.2-6) and at least eight are considered perennial (Table 3.2-8). The identified potentially-impacted perennial springs are all located at high elevations in the Roberts Mountains and on the flanks of Mount Hope, and within approximately four miles of the proposed open pit. The source of these springs is believed to be the fractured bedrock aquifer, which receives recharge from the higher elevations as infiltration of snowmelt and rainfall.

Surface water flow in Roberts Creek, located approximately 6.5 miles west of the proposed open pit, is fed by springs that flow into Roberts Creek or its tributaries. The upper spring-fed segments of Roberts Creek generally flow throughout the year, **and as with other springs in the upper elevations of Roberts Mountain,** the springs within the drawdown area that feed those segments are believed to originate in areas of localized, perched ground water that are not hydraulically interconnected with the regional ground water system. It is **also** possible that geologic block faulting has compartmentalized the ground water flow at some of these spring sites so that they would be isolated from mine-induced drawdown, but there is no available evidence to define such conditions if they exist. For the purposes of this analysis, it was conservatively assumed that all of the springs located in the area **projected to experience ten feet or more of drawdown** are interconnected with the regional ground water system and potentially could be impacted due to water-table lowering attributable to the Proposed Action.

Surface flow in Roberts Creek diminishes below the confluence of its upper three forks, where the creek enters a small limestone canyon for approximately one mile and then opens into a broad alluvial channel after the stream exits the mountain valley. It is assumed that stream flow in that reach potentially could be impacted due to water-table lowering attributable to the Proposed Action because the simulated ground water drawdown is greater than ten feet beneath a perennial segment of Roberts Creek.

Surface water flow in the South Fork of Henderson Creek, located approximately three miles northwest of the proposed open pit, is perennial and is believed to be sustained by both perennial and non-perennial springs in headwater drainages that feed into the creek. Year-round flow occurs along at least a two-mile segment of the South Fork of Henderson Creek and ceases near its confluence with the North Fork of Henderson Creek, where all of the surface water flow infiltrates into the stream bed. Then approximately ten miles downgradient, the flow resurfaces, where it is used for irrigation. It is assumed that stream flow in that reach potentially could be impacted due to water table lowering attributable to the Proposed Action because the simulated ground water drawdown is greater than ten feet beneath a perennial segment of the South Fork of Henderson Creek. The other streams in the HSA are either located outside of the maximum-extent-of-drawdown induced by the Proposed Action, or are intermittent or ephemeral streams that would not be expected to be significantly impacted by mine-related dewatering and KVCWF pumping.

The actual impacts to individual stream reaches or springs would depend on the source of ground water that sustains the flow (perched or hydraulically isolated aquifer versus regional ground water system) and the actual extent of mine-induced drawdown that occurs in the area. The interconnection (or lack thereof) between surface water features and deeper ground water sources is controlled in large part by the specific hydrogeologic conditions that occur at each site. Considering the complexity of the hydrogeologic conditions in the region and the inherent uncertainty in numerical modeling predictions relative to the exact areal extent of a predicted drawdown area, it is not possible to conclusively identify specific stream segments or springs that would or would not be impacted by future mine-induced ground water drawdown; **however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity**.

If the Project is approved, EML would be required to monitor surface and ground water to assess the extent of drawdown from open pit dewatering and ground water production over time and the potential effects to surface and ground water resources in the vicinity of the Project. EML's proposed monitoring program is outlined in Section 2.1.15 and Appendix **C** of this EIS.

- **Impact 3.2.3.3-2**: The ground water drawdown under the Proposed Action is predicted to be more than ten feet for two perennial stream segments (Roberts Creek and South Fork of Henderson Creek) and at 22 perennial or potentially perennial spring sites (Table 3.2-8) for varying periods of time up to at least 400 years after the end of the mining and milling operations. **Other individual streams and springs outside of the model predictions could also be impacted.**

  Significance of the Impact: The impacts are potentially significant at the two stream segments and 22 springs discussed above. Although significant impacts are not predicted to occur in the other individual streams or springs in the HSA due to the Proposed Action, the uncertainty of predicting impacts to streams and springs indicates a need for operational monitoring and mitigation measures to be implemented. If **monitoring, which has been incorporated into the mitigation measure, indicates that** there are reduced flows in perennial stream segments that the BLM determines can be attributed to the mining operation, then **specific** mitigation would be implemented, as described below. **Potential adverse effects to surface water rights would be mitigated under NDWR jurisdiction.**

- **Mitigation Measure 3.2.3.3-2a:** Specific mitigation for the two perennial stream segments and 22 perennial or potentially perennial spring sites are outlined in Table 3.2-9. **Figure 3.2.21 shows the anticipated location for the components of the facilities necessary to implement the mitigation measures outlined in Table 3.2-9. Implementation of any of the specific mitigation outlined in Table 3.2-9 for springs located on private land would be subject to the authorization of the private land owner. The site-specific evaluation of the effectiveness of this specific mitigation for each identified surface water resource within the mine-related ground water drawdown area is presented in Table 3.2-9. The site-specific measures include one or more methods identified in Mitigation Measure 3.2.3.3-2b. Similar methods (as identified in Table 3.2-9) would also be applied to streams and springs not identified**

in this analysis, if monitoring indicates that there are impacts that the BLM determines can be attributed to the mining operation. Implementation of the mitigation outlined in Table **3.2-9** would result in up to **approximately 37.2** acres of additional surface disturbance associated with **road and** pipeline construction and maintenance, **as well as the need for approximately 302 acre-feet of water that would at least initially come from EML's existing water rights if additional water rights have not yet been secured. This specific mitigation would be implemented, as determined by the BLM, based on the results of the monitoring that is also outlined in this mitigation measure.** EML would implement the water monitoring provisions outlined in Section 2.1.15 and Appendix **C** to track the drawdown associated with the open pit dewatering and ground water production activities. In addition, EML would periodically update the ground water flow model as determined by the BLM. EML would be responsible for monitoring and annual reporting of changes in ground water levels and surface water flows prior to and during operation, and for a period of up to 30 years in the post mining and milling phase. **The reports would be in a format and with a content that is acceptable to the BLM. The monitoring outlined in Appendix C and required in this mitigation measure would be used to document the effectiveness of the implemented specific mitigation activities. In addition, the BLM has the ability to require the implementation of additional mitigation measures if the initial implementation is unsuccessful.**

- **Mitigation Measure 3.2.3.3-2b:** If monitoring (Mitigation Measure 3.2.3.3-2a) indicates that flow reductions of perennial surface waters are occurring and that these reductions are likely the result of mine-induced drawdown, the following measures would be implemented:

  1. The BLM would evaluate the available information and determine whether mitigation is required.

  2. If mitigation would be required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted perennial water resource(s). Potential adverse effects to water rights from the Project would be mitigated **under** NDWR jurisdiction, **as well as potential need for additional BLM permit acquisition activities and NEPA analysis**. The mitigation plan would be submitted to the BLM identifying the excess amount of drawdown or drawdown impacts to surface water resources. Mitigation would depend on the actual impacts, site-specific conditions, and historical use and could include a variety of measures (e.g., flow augmentation, on-site or off-site improvements). Methods to enhance or replace the impacted perennial water resources include, but are not limited to, the following:

     - Modification, **including cessation,** of pumping distribution in the water supply well field;
     - Injection to confine the drawdown cone;
     - Installation of a water-supply pump in an existing well (e.g., monitoring well);
     - Installation of a new water production well;
     - Piping from a new or existing source;

- Installation of a guzzler;
- Enhanced development of an existing seep or spring to promote additional flow;
- **Water hauling;**
- **Removal of piñon-juniper in impacted watersheds;** or
- Fencing or other protective measures for an existing seep to maintain flow.

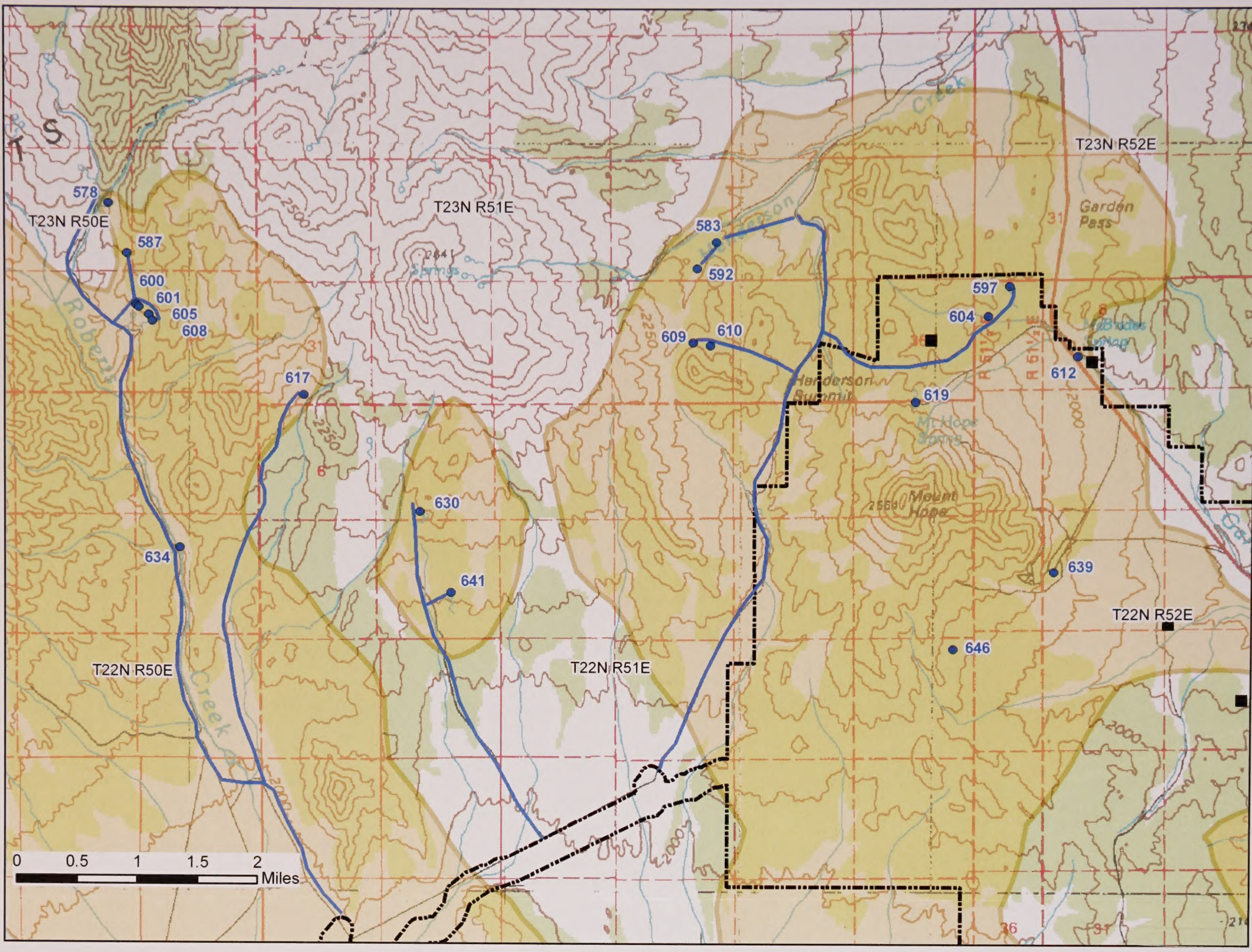
3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures.

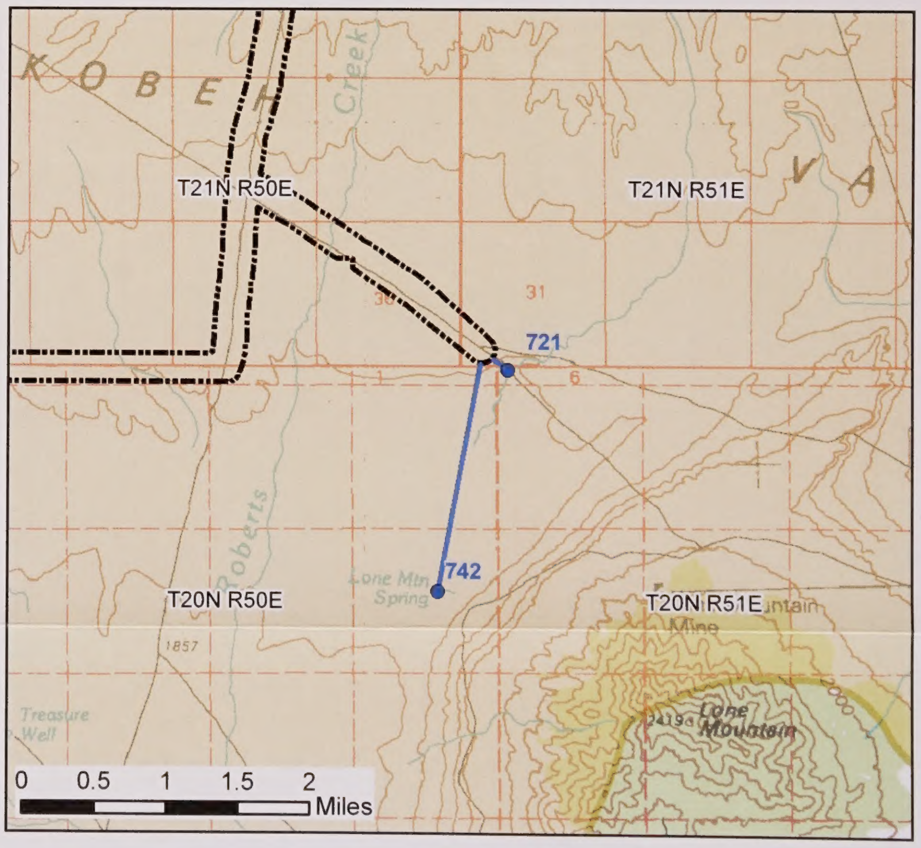
- **Mitigation Measure 3.2.3.3-2c**: The numerical ground water flow modeling indicates that some impacts to springs may occur after the end of mining and milling operations, when some of the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the closure process consistent with regulations and policies using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. If the BLM determines that the Project impacts perennial stream segments or springs in this post-operational phase, mitigation consisting of one or both of the following measures would be required:

  1. Installation of a well and pump at affected stream or spring locations to restore the historic yield of the affected surface water resource.

  2. Posting of an additional financial guarantee to provide for potentially affected water supplies in the future.

- **Effectiveness of Mitigation and Residual Effects:** Mitigation would be designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. The effectiveness of Mitigation Measure 3.2.3.3-2c, if implemented, is less certain since it would be many decades in the future. If initial implementation was not successful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. However, **this type of mitigation has been proven to be effective and** if measures used in Mitigation Measure 3.2.3.3-2b are implemented, then the measure should be effective at mitigating the impacts from reduced surface water flows. Over a long period of time (tens to **hundreds** of years) the effects to most surface water flows would diminish; however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity.


T23N R50E
T23N R51E
T23N R52E
T22N R50E
T22N R51E
T22N R52E
578
587
600
601
605
608
617
630
641
634
583
592
609
610
597
604
612
619
639
646
Henderson Summit
Mt Hope Spring
Mount Hope
Garden Pass
Roberts Creek
0 0.5 1 1.5 2 Miles


K O B E H V A
Creek
T21N R50E
T21N R51E
721
742
Lone Mtn Spring
T20N R50E
T20N R51E
Roberts
Treasure Well
Lone Mountain
0 0.5 1 1.5 2 Miles

EXPLANATION

- ⬚ Project Boundary
- ▨ 10-Foot Drawdown Maximum Extent
- ● Impacted Mine Only Springs
- ■ Guzzler Installations
- — Pipelines with Existing or New Roads

N

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FILE NAME: p1635_Fig3-2-21_SurfaceWaterMitigationComponents.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Proposed Action Surface Water Mitigation Components

Figure 3.2.21

Table 3.2-9: Surface Water Resources Specific Mitigation

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics (as of the 2011 Site Visit)	Associated Riparian/ Wetland Vegetation (acres)[2]	General Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate) and Affected Resources
578	Unnamed Spring	74.20	This site is an emergent spring with water flowing from the hillside rocks 100 feet upstream to Roberts Creek. This site supports a diverse riparian vegetation community	0.120	Water supply for wildlife, livestock, and wild horses.	**Reduction of** flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-1: Pipe water along an existing road, approximately **7.1** miles long, from the Project water supply at a sustained rate of approximately 70 gpm.	The mitigation plan for SSMM-1 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses, as well as flows for existing downstream irrigation uses.	Up to approximately **8.6** acres of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, including a limited amount of preliminary priority habitat for greater sage-grouse, air quality impacts, and potential impacts to cultural resources.**
583	Unnamed Spring	5.62	This site is a seep within a channel producing flow down gradient from the source. This site supports a riparian vegetation community.	0.030	Water supply for wildlife and wild horses with limited livestock use.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-2: Pipe water along an existing road, approximately **5.5** miles long, from the Project water supply at a sustained rate of approximately five gpm.	The mitigation plan for SSMM-2 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses, as well as flows for existing downstream irrigation uses.	Up to approximately **6.7** acres of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, including a limited amount of preliminary priority habitat for greater sage-grouse, air quality impacts, and potential**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics (as of the 2011 Site Visit)	Associated Riparian/ Wetland Vegetation (acres)[2]	General Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate) and Affected Resources
									impacts to cultural resources.
587	Unnamed Spring	0.00	This site is a seep that contains ponded standing water within hoof depressions only. Moderate hummocking was observed. The riparian vegetation community is present. An old fenceline runs through the middle of the site with fence posts remaining.	0.110	Water supply for wildlife, livestock, and wild horses.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in ground water levels in this area, as determined from ground water monitoring	SSMM-3: Pipe water along a new road, approximately 0.3 mile long, from the pipeline to spring 578 at a sustained rate of approximately 0.5 gpm.	The mitigation plan for SSMM-3 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 0.7 acre of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics (as of the 2011 Site Visit)	Associated Riparian/ Wetland Vegetation (acres)[2]	General Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate) and Affected Resources
592	Unnamed Spring (OT-2)	11.90	This site is a seep with saturated soil, but not contributing flow into the drainage. This site supports a riparian vegetation community.	0.250	Water supply for wildlife and wild horses with limited livestock use.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-4: Pipe water along an existing road, approximately 0.3 mile long, from the pipeline to spring 583 at a sustained rate of approximately 0.5 gpm.	The mitigation plan for SSMM-4 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 0.7 acre of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**
597	Garden Spring	0.00	This site consists of two adjacent ponded sources of water. There is piping and an old trough downgradient of the sites that is no longer functioning. Riparian vegetation is supported by these sites.	0.020	Water supply for wildlife, livestock, and wild horses.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-5: Pipe water along an existing and new road, approximately **1.5** miles long, from the pipeline to spring 583 at a sustained rate of approximately 0.5 gpm.	The mitigation plan for SSMM-5 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately **1.8** acres of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, including a limited amount of preliminary priority habitat for greater sage-grouse, air quality impacts, and potential impacts to cultural resources.**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics (as of the 2011 Site Visit)	Associated Riparian/ Wetland Vegetation (acres)[2]	General Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate) and Affected Resources
600	Unnamed Spring	0.00	This site is a seep located in an aspen stand. Flow from this site combines with flow from site 601 (to the east) and flows into a spring/meadow complex. Riparian vegetation is supported by this site.	2.360	Water supply for wildlife, livestock, and wild horses.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-6: Pipe water along an existing road, approximately 0.2 mile long, from the pipeline to spring 578 at a sustained rate of approximately 0.5 gpm.	The mitigation plan for SSMM-6 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 0.3 acre of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**
601	Unnamed Spring	6.80	This site is a seep located in an aspen stand. Flow from this site combines with flow from site 600 (to the west) and flows into a spring/meadow complex. Riparian vegetation is supported by this site.	0.00*	Water supply for wildlife, livestock, and wild horses.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-7: Pipe water along an existing road, approximately 0.03 mile long, from the pipeline to spring 600 at a sustained rate of approximately 0.5 gpm.	The mitigation plan for SSMM-7 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 0.1 acre of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**

Spring Number	**Spring Name**	**Flow (gpm)**[1]	**Site Characteristics (as of the 2011 Site Visit)**	**Associated Riparian/ Wetland Vegetation (acres)**[2]	**General Use**	**Mitigation Trigger**	**Contingency Mitigation Plan**	**Effectiveness of Site-Specific Mitigation Plan**	**New Disturbance From Mitigation Implementation**[3] **(acres-approximate) and Affected Resources**
604	Unnamed Spring	0.00	This site consists of a man-made pond. The site has little riparian vegetation around the edge of the pond.	0.060	Water supply and riparian habitat for wildlife, livestock, and wild horses.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-8: Pipe water along an existing road, approximately 0.1 mile long, from the pipeline to spring 597 at a sustained rate of approximately 0.5 gpm.	The mitigation plan for SSMM-8 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 0.1 acre of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, including a limited amount of preliminary priority habitat for greater sage-grouse, air quality impacts, and potential impacts to cultural resources.**
605	Unnamed Spring	4.40	This site is part of a four spring complex with two channels flowing and is surrounded by Site 600, Site 601, and Site 608. These four sites are connected by riparian vegetation. Flow leaves the site in two separate channels. Riparian vegetation is present at this site.	0.00*	Water supply for wildlife, livestock, and wild horses.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-9: Pipe water along an existing road, approximately 0.1 mile long, from the pipeline to spring 601 at a sustained rate of approximately 0.5 gpm.	The mitigation plan for SSMM-9 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 0.2 acre of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics (as of the 2011 Site Visit)	Associated Riparian/ Wetland Vegetation (acres)[2]	General Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate) and Affected Resources
608	Unnamed Spring	4.20	This site is part of a four spring complex and consists of a saturated area with flow forming in the channel below. Riparian vegetation is supported at this site	0.00*	Water supply for wildlife, livestock, and wild horses.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-10: Pipe water along an existing road, approximately 0.06 mile long, from the pipeline to spring 605 at a sustained rate of approximately 0.5 gpm.	The mitigation plan for SSMM-10 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 0.1 acre of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**
609	Unnamed Spring (OT-5)	0.06	This site consists of a seeping area with a man-made berm to create a pond. There is flow from the seeping area into the pond, but no flow is leaving the pond. Riparian vegetation is supported at this site.	0.170	Water supply for wild horses with limited livestock use.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-11: Pipe water along an existing road, approximately 1.0 mile long, from the pipeline to spring 583 at a sustained rate of approximately 0.5 gpm.	The mitigation plan for SSMM-11 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 1.2 acres of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics (as of the 2011 Site Visit)	Associated Riparian/ Wetland Vegetation (acres)[2]	General Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate) and Affected Resources
610	Unnamed Spring (OT-3)	1.40	This site consists of a spring flowing into a pond created by a man-made berm. Water also flows from the man-made pond. Riparian vegetation is supported at this site.	0.120	Limited use as a water supply for wildlife, livestock, and wild horses.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-12: **Pipe water along an existing road, approximately 0.1 mile long, from the pipeline to spring 609 at a sustained rate of approximately 1.0 gpm.**	Mitigation plan for SSMM-12 would be highly effective at maintaining a water supply for wildlife.	Approximately 0.**2** acre of new surface disturbance for **the water pipeline. This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**
612	McBrides Spring[4]	0.35	The site is a spring that has been developed with a valve box and water trough. Flow to the trough is controlled by a valve. There is no riparian vegetation at this site.	0.000	Perennial water supply for livestock, wildlife, and wild horses.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-13: Install a guzzler designed for large game.	Mitigation plan SSMM-13 would be highly effective at maintaining a water supply for wildlife.	Approximately 0.7 acre of new surface disturbance for guzzler installation. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, including preliminary general habitat for greater sage-grouse, air quality impacts, and potential impacts to cultural resources.**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics (as of the 2011 Site Visit)	Associated Riparian/ Wetland Vegetation (acres)[2]	General Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate) and Affected Resources
617	Unnamed Spring	0.00	This site consists of an area saturated by a seep. There is no flow at this site. Riparian vegetation is supported at this site.	0.110	Water supply and riparian habitat for wildlife and wild horses, and limited livestock use.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-14: Pipe water along an existing road, approximately **3.1** miles long, from the pipeline to spring 578 at a sustained rate of approximately 0.5 gpm.	The mitigation plan for SSMM-14 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately **3.8** acres of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, including a limited amount of preliminary priority habitat for greater sage-grouse, air quality impacts, and potential impacts to cultural resources.**
619	Mount Hope Spring[4]	0.03	This site is a low-flow spring that has been developed with a trough. There is no riparian vegetation at this site.	0.000	Wildlife and wild horses.	Prior to the construction of the Project fence.	SSMM-15: Install a guzzler north of the Project fence designed for large game.	Mitigation plan for SSMM-15 would be highly effective at maintaining a water supply for wildlife.	Approximately 0.7 acre of new surface disturbance for guzzler installation. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics (as of the 2011 Site Visit)	Associated Riparian/ Wetland Vegetation (acres)[2]	General Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate) and Affected Resources
630	Unnamed Spring (OT-8)	7.31	This site consists of a spring that has been partially developed with piping. Water is piped from the source to a bermed ponded area holding water then into a second bermed ponded area. The site is partially fenced. Riparian vegetation is supported at this site.	0.080	Water supply for wild horses with limited livestock use.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-16: Pipe water along an existing road, approximately 3.2 miles long, from the Project water supply at a sustained rate of approximately seven gpm.	The mitigation plan for SSMM-16 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 3.9 acres of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, including preliminary priority and general habitat for greater sage-grouse, air quality impacts, and potential impacts to cultural resources.**
634	Farrington Spring	1.10	This site consists of a bank seep adding flow to the drainage. Riparian vegetation is supported by this site.	0.001	Water supply for wild horses with limited livestock use.	Any mitigation for this site would be addressed and covered under the mitigation for Roberts Creek. See SSMM-22.	**SSMM-17: Pipe water along an existing road, approximately 0.1 mile long, from the pipeline to spring 578 at a sustained rate of approximately 1.0 gpm.**	**The mitigation plan for SSMM-17 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.**	**Up to approximately 0.2 acre of new surface disturbance for the installation and maintenance of the water pipeline. This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics (as of the 2011 Site Visit)	Associated Riparian/ Wetland Vegetation (acres)[2]	General Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate) and Affected Resources
639	Zinc Adit	2.00	This site consists of water flowing from underground workings. The site supports an area of saturated soils and sparse riparian vegetation.	0.120	Water supply for wild horses with limited livestock use.	Prior to the construction of the Project fence.	SSMM-18: Install a guzzler east of the Project fence and west of SR 278 designed for large game.	Mitigation plan for SSMM-18 would be highly effective at maintaining a water supply for wildlife.	Approximately 0.7 acre of new surface disturbance for guzzler installation. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, including preliminary general habitat for greater sage-grouse, air quality impacts, and potential impacts to cultural resources.**
641	Unnamed Spring (OT-7)	2.70	This site is a spring contained with the aid of earthen berms to form ponds. There is non-functioning piping present at the site. Riparian vegetation is supported at the site.	0.290	Water supply for wild horses with limited livestock use.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-19: Pipe water along a new road, approximately 0.2 mile long, from the pipeline to spring 630 at a sustained rate of approximately two gpm.	The mitigation plan for SSMM-1 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 0.1 acre of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, including preliminary general habitat for greater sage-grouse, air quality impacts, and potential impacts to cultural resources.**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics (as of the 2011 Site Visit)	Associated Riparian/ Wetland Vegetation (acres)[2]	General Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate) and Affected Resources
646	Unnamed Spring (SP-7)	0.00	This site is a ponded spring with no flow. Riparian vegetation is present at this site.	0.000	Perennial water supply for livestock, wildlife, and wild horses.	Prior to the construction of the Project fence.	SSMM-**20**: Install a guzzler east of the Project fence and west of SR 278 designed for large game.	Mitigation plan for SSMM-**20** would be highly effective at maintaining a water supply for wildlife.	Approximately 0.7 acre of new surface disturbance for guzzler installation. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, including preliminary general habitat for greater sage-grouse, air quality impacts, and potential impacts to cultural resources.**
721	Mud Spring	0.00	This site consists of a spring emerging from the alluvium creating a pond in the valley. Riparian vegetation is supported at this site.	0.310	Water supply for wild horses with limited livestock use.	**This impact is likely to occur shortly after ground water production begins. Six months after wellfield production begins.**	SSMM-**21**: Pipe water along an existing road, approximately 0.1 mile long, from the Project water supply at a sustained rate of approximately 0.5 gpm.	The mitigation plan for SSMM-**21** would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 0.2 acre of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, including preliminary priority habitat for greater sage-grouse, air quality impacts, and potential impacts to cultural resources.**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics (as of the 2011 Site Visit)	Associated Riparian/ Wetland Vegetation (acres)[2]	General Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate) and Affected Resources
742	Lone Mountain Spring (KV035)	0.00	This site consists of a spring emerging from the alluvium creating a pond in the valley. Riparian vegetation is supported at this site.	0.200	Water supply for wild horses with limited livestock use.	**This impact is likely to occur shortly after ground water production begins. Six months after wellfield production begins.**	SSMM-22: Pipe water along a new road, approximately 1.4 miles long, from the Project water supply at a sustained rate of approximately 0.5 gpm.	The mitigation plan for SSMM-22 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 3.5 acres of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, including preliminary priority habitat for greater sage-grouse, air quality impacts, and potential impacts to cultural resources.**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics (as of the 2011 Site Visit)	Associated Riparian/ Wetland Vegetation (acres)[2]	General Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate) and Affected Resources
--	Roberts Creek[4]	**168**[6]		*[5]	Perennial water supply for irrigation, livestock, wildlife, and wild horses.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-2**3**: Pipe water from the Project water supply at a minimum sustained rate of approximately **170** gpm. The supplemental flows would be discharged to the stream at multiple locations, as determined by the BLM. The pipeline under SSMM-1 would be utilized for this mitigation measure.	The mitigation plan for SSMM-2**3** would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses, as well as flows for existing downstream irrigation uses.	Up to approximately one acre of new surface disturbance for the installation and maintenance of the water pipeline. The pipeline under SSMM-1 would be utilized for this mitigation measure. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics (as of the 2011 Site Visit)	Associated Riparian/ Wetland Vegetation (acres)[2]	General Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate) and Affected Resources
--	Henderson Creek[4]	**40[6]**		*[5]	Perennial water supply for irrigation, livestock, wildlife, and wild horses.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-24: Pipe water from the Project water supply at a minimum sustained rate of approximately 40 gpm. The supplemental flows would be discharged to the stream at multiple locations, as determined by the BLM. The pipeline under SSMM-2 would be utilized for this mitigation measure.	The mitigation plan for SSMM-24 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses, as well as flows for existing downstream irrigation uses.	Up to approximately one acre of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**

[1] All flow data in this table from JBR 2011, unless otherwise noted

[2] All acreage data in this table from JBR 2011, unless otherwise noted

[3] Disturbance areas would be managed and reclaimed in accordance with BLM and State of Nevada requirements.

[4] Flows from Montgomery et al. 2010

[5] The riparian areas along the creeks have not been mapped in detail.

[6] Data from Interflow 2012

3.2.3.3.2 Ground Water Resources

Lowering of the Water Table

The dewatering associated with the proposed open pit mining would lower the bedrock ground water elevations by approximately 2,250 feet in the vicinity of the open pit during mining operations. At the same time, and continuing for 12 years after the end of pit dewatering, pumping in the KVCWF for process water supply would lower the water table in the basin-fill and bedrock aquifers of central Kobeh Valley and the southern part of the Roberts Mountains. Based on numerical ground water flow modeling, the expected amount of drawdown near the center of the KVCWF is approximately 120 feet after 44 years of pumping under the Proposed Action (Montgomery et al. 2010). The ground water levels in the areas of the open pit and the KVCWF would begin to recover immediately after Project-related dewatering and pumping cease. The Regional Model was used to evaluate water level recovery for a post-Project period of 400 years, whereas the post-Project recovery time frame simulated with the Local Model was 1,580 years. The longer period simulated with the Local Model exceeded the time required for ground water recovery in the pit area and for pit lake formation, but was completed to ensure that equilibrium conditions had been achieved for the pit lake (Figure 3.2.2**2**).

Impacts to Ground Water Resources

Potential impacts to ground water resources and thus the associated ground water users within the area affected by drawdown were evaluated based on the ground water flow modeling results. Such impacts may involve lowering of ground water levels at wells. The Regional Model was used to evaluate potential impacts to wells, in addition to the surface water resources discussed above in Section 3.2.3.3.1. The evaluation of drawdown considered modeling results at eight different points in time: at the end of mining and milling operations (in 2055), and at ten, 30, 50, 100, 200, 300, and 400 years post-Project.

For the purpose of this analysis, all water rights owned or controlled by EML as of July 1, 2011, were excluded from consideration. As shown in Table 3.2-6 and Figure 3.2.20, there are seven wells located within the simulated mine-induced drawdown area (i.e., area where the ground water levels are predicted to be lowered by ten feet or more as a result of the mine st**ock**watering and well field pumping activities under the Proposed Action) that are not associated with EML water rights.

In addition to the seven wells with associated ground water rights located within the simulated mine-induced drawdown area, there also are two wells (Wells 204 and 310) used for stock watering that do not have associated water rights. As shown in Table 3.2-7, the magnitude, timing, and duration of the predicted drawdown varies for these different locations. Based on the modeling results, all of the nine wells are predicted to experience recovery of ground water levels resulting in less than ten feet of drawdown within 100 years post-Project. In addition, there is a domestic water well at the Roberts Creek Ranch that is within the ten-foot drawdown contour. Further, Nevada water law allows for one domestic water well per private parcel; therefore, there is a potential for additional undocumented (not filed with the NDWR) domestic water wells affected by the drawdown because they are within the ten-foot drawdown cone of depression. Impacts to, and mitigation for, water rights are **under** the jurisdiction of the NDWR. **The BLM would not address or mitigate impacts to water rights.**

Changes to water levels at the location of the seven wells with associated **active** ground water **use with water** rights listed in Table 3.2-10 are considered to be significant under the Proposed Action because the associated wells are used or could be used to produce water, and because they are thought to be hydraulically connected to the basin-fill and bedrock aquifers affected by drawdown. Changes to water levels at the locations of the two additional stockwatering wells listed in Table 3.2-10 are not deemed significant because neither one is associated with a valid and active water right.

- **Impact 3.2.3.3-3:** The ground water drawdown is predicted to exceed ten feet at the locations of seven wells with associated **active** ground water **use with water** rights.

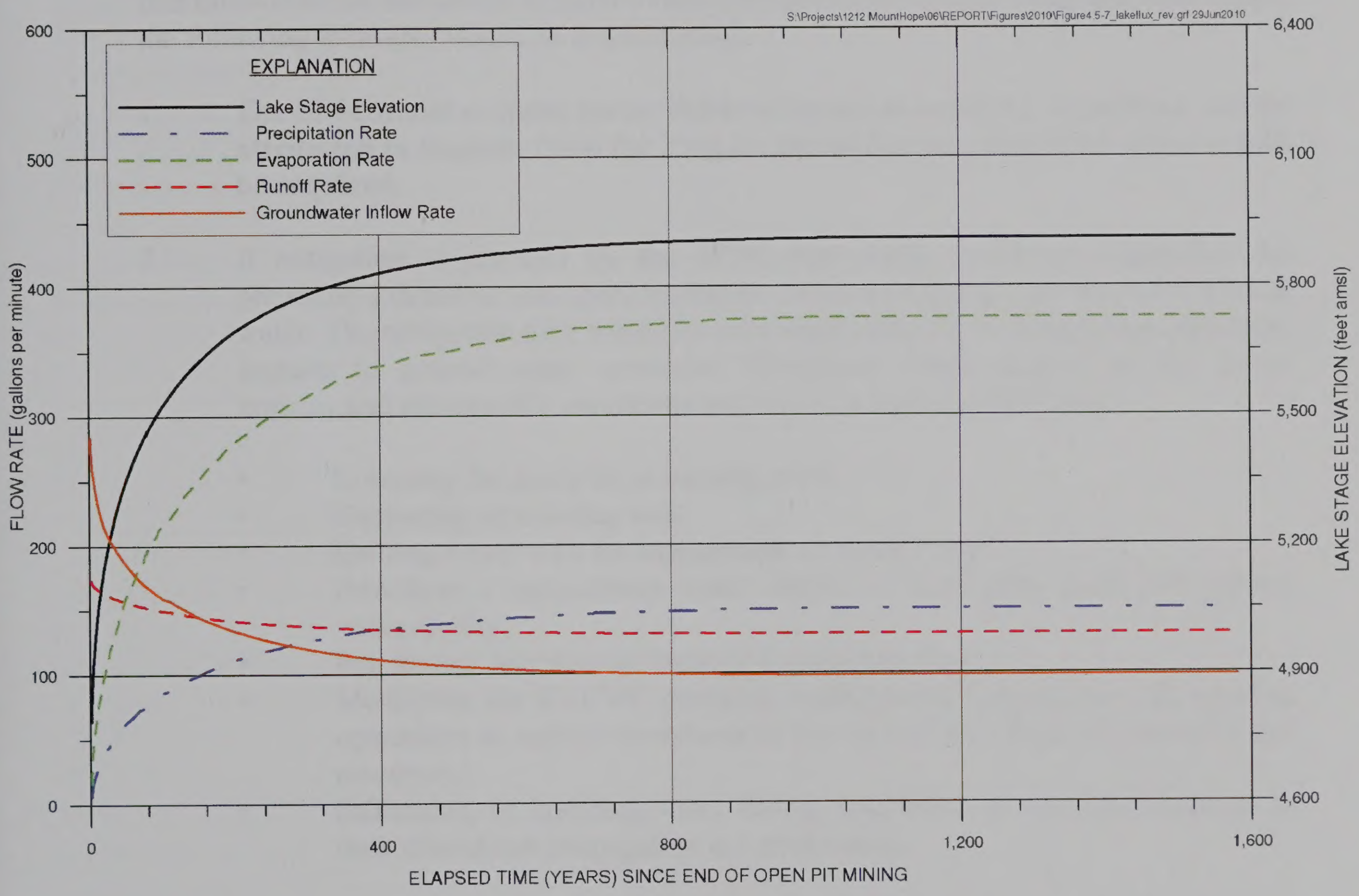
  Significance of the Impact: Impacts to the seven wells with associated ground water **use with water** rights listed in Table 3.2-10 are potentially significant until such time as the ground water level recovers to less than ten feet of drawdown, which is predicted to be less than 100 years post-Project in all cases. The impacts would become less than significant after implementation of the mitigation measures described below. Potential adverse effects to ground water rights would be mitigated **under NDWR. Therefore, no mitigation measures are proposed by the BLM for ground water rights. Section 3.26 includes suggested mitigation outside the BLM's jurisdiction for water rights.**

Table 3.2-10: Estimated Water Level Change at Ground Water Rights and Wells that May be Affected by Project Activities

Water Right Permit Number	Well Inventory Number	Years After End of Dewatering and KVCWF Pumping (drawdown in feet)							
		0	10	30	50	100	200	300	400
43025	123	42	34	22	15	6	3	1	1
44774	292	10	13	14	13	7	5	1	1
44775	218	30	30	23	17	7	4	1	1
47907	317	12	11	10	10	9	9	9	8
48684	162	18	19	15	12	5	3	1	1
71594	127	13	15	14	10	4	2	1	1
11188, R06952	494	12	10	7	5	2	1	<1	<1
-	204	8	10	11	11	6	4	1	1
-	310	69	46	28	19	8	5	1	1

Note: Does not include ground water rights or wells owned or controlled by EML as of July 1, 2011.
Source: Montgomery et al. (2010)

- **Mitigation Measure 3.2.3.3-3a:** For the seven wells with associated **active** ground water **use with water** rights EML would assess the distance of the screened interval and the pumping below the ground water table. If that difference is greater than maximum predicted drawdown, then EML would pay the water right holder for the increase in pumping costs based on historical usage. If the difference is greater than ten feet, then EML would pay for either the lowering of the pump to a depth greater than the maximum drawdown in the well, or the completion of a new well with the screened depth greater



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BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Rate of Pit Lake Development Under the Proposed Action

Figure 3.2.22

than the maximum predicted drawdown and pay the water right holder for the increase in pumping costs based on historic usage. In addition, EML would implement the water monitoring provisions outlined in Section 2.1.15 and in Appendix **C**. If, through implementation of the water monitoring, it is determined that there are impacts to wells with associated **active** ground water **use with water** rights attributable to the Project, whether predicted or not, then the following mitigation measures would be implemented.

- **Mitigation Measure 3.2.3.3-3b:** If monitoring (Mitigation Measure 3.2.3.3-3a) indicates that mine-induced drawdown impacts a well with associated **active** water **use with** rights, the following measures would be implemented:

  1. The BLM would evaluate the available information and **if the drawdown can be attributed to impacts from the Project, the mitigation described above would be required**.
  2. If mitigation is required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted ground water. The mitigation plan would be submitted to the BLM identifying drawdown impacts to ground water resources. Mitigation would depend on the actual impacts and site-specific conditions and could include the following:
     - Lowering the pump in an existing well;
     - Deepening an existing well;
     - Drilling a new well for replacement of water supply;
     - Providing a replacement water supply of equivalent yield and general water quality;
     - Pay for any incremental increase in pumping costs.
     - Modifying the KVCWF pumping regime (well locations or rates) during operations to reduce drawdown in the area of the impacted ground water resources;
     - Infiltrating or injecting water during operations at strategic locations to limit drawdown propagation in certain areas.
  3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures.

- **Mitigation Measure 3.2.3.3-3c**: For any significant impacts to wells with associated **active** ground water **use with water** rights that do not occur until after the end of mining and milling operations, the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the closure process consistent with regulations and policies using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. Wells **with** associated active ground water **use with water** rights not owned or controlled by EML that are indicated to be significantly impacted would then be mitigated by **EML using** one or more of the following measures, as directed by the BLM:

1. Installation of a deeper well and pump at affected locations to restore the historical yield of the well (including incremental increase in pumping costs).
2. Posting of a funding mechanism to provide for potential future impacts to potentially affected water **sources**.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.2.3.3-3b and the use of any of the options outlined above would be effective at mitigating the impacts to **wells with associated active** ground water **use with water** rights. Mitigation would be designed to address the specific ground water source that is affected, which enhances the effectiveness of the mitigation. Because the mitigation measures are specifically intended to directly address the impact by providing financial compensation or ensuring that the water is made available, and because the measures **would** be reviewed and assessed by the BLM, these mitigation measures are expected to be effective. If initial implementation were unsuccessful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. Any residual effects to ground water **uses** would be fully mitigated and over a long period of time (tens to **hundreds** of years) the drawdown effects would fully diminish, except in the vicinity of the open pit where the effects would be in perpetuity.

Impacts to Basin Water Budgets

The water balance for the ground water system within the HSA was estimated using the calibrated ground water flow model (Montgomery et al. 2010) and the mine dewatering and consumptive use assumptions for the Cumulative Action Scenario and the No Action Alternative, as described in Section 3.2.3.2. The water budget changes attributable to the Proposed Action were derived from these results by using the same subtraction procedure that was used in the drawdown analysis, as described in Section 3.2.3.2.4. For comparison, the estimated annual ground water inflow and outflow rates under the baseline condition (2009) are summarized in Table 3.2-5. Projected future changes to the various components of the water budget under the Proposed Action are summarized for the final year of mining and milling operations and for 50 years after all mine-related pumping has ceased in Tables 3.2-11 and 3.2-12, respectively; the projected future changes due to the Proposed Action were estimated relative to the No Action Alternative water budgets at the same points in time (see Section 3.2.3.4.2). The estimated water budgets and net changes in total inflow and outflow reflect changes in storage and fluctuations of the major inflow and outflow components over time resulting from mine pit dewatering and KVCWF pumping.

The estimated changes in annual ground water budgets under the Proposed Action indicate that the mine-induced drawdown associated with pit dewatering and KVCWF pumping is predicted to result in a decrease in **ET** in all basins of the HSA. Most of the predicted decrease (95 percent at 50 years after the end of mine-related pumping) in **ET** within the HSA occurs in Kobeh Valley. The predicted water table drawdown in Kobeh Valley extends to the mapped phreatophyte areas northwest of Bean Flat and east of Lone Mountain (Figure 3.2.20). The predominant phreatophyte vegetation in these areas is greasewood. The simulated extinction depth for greasewood is 40 feet below the ground surface, and the ground water model results indicate that the magnitude of drawdown along the perimeter of these phreatophyte vegetation areas would exceed the extinction depth for some period of time (Montgomery et al. 2010). This could potentially lead to a decrease in the number and density of phreatophyte plants and an associated decrease in **ET** of ground water, as reflected in the estimated water budget changes listed in Tables 3.2-11 and 3.2-12.

Table 3.2-11: Estimated Change in Annual Ground Water Budgets in Final Year of Project (2055) Under the Proposed Action, Relative to the No Action Alternative[1]

Budget Component	**Antelope Valley**	**Diamond Valley**	**Kobeh Valley**	**Pine Valley (within the HSA)**	**Entire HSA**
Change in Ground Water Inflow[2] (afy)					
Precipitation Recharge	0	**-226**	**-38**	0	0
Subsurface Inflow[4]	0	70 (55 from Pine Valley and 15 from Kobeh Valley)	201 (1 from Monitor Valley, 33 from Antelope Valley, and 167 from Pine Valley)	0	1 (from Monitor Valley to Kobeh Valley)
Net Change in Total Inflow	**0**	**-156**	**163**	**0**	**1**
Change in Ground Water Outflow[2] (afy)					
Evapotranspiration[3,4]	-16	-52	-4,015	-11	-4,094
Net Ground Water Pumping[5]	0	0	11,300	0	11,300
Subsurface Outflow[4]	33 (to Kobeh Valley)	0	15 (to Diamond Valley)	222 (55 to Diamond Valley and 167 to Kobeh Valley)	0
Net Change in Total Outflow	**17**	**-52**	**7,285**	**211**	**7,206**

[1] Estimation based on sources of data and methods described in Montgomery et al. (2010), including results from the calibrated numerical ground water model.

[2] Positive values indicate increase and negative values indicate decrease in water budget component or in net change in total inflow and outflow.

[3] Includes ET from phreatophyte areas and evaporation from playas and spring discharge.

[4] Source: Montgomery et al. (2010), Table 4.4-7.

[5] Source: Montgomery et al. (2010), Figure 4.4-2.

In the final year of operations under the Proposed Action (2055), the estimated available ground water in Diamond Valley is predicted to be reduced by 52 afy as a result of open pit dewatering and KVCWF pumping, relative to the No Action Alternative at that same point in time (Table 3.2-11). An increase in subsurface inflow to Diamond Valley of 70 afy (55 afy from Pine Valley and 15 afy from Kobeh Valley) also is predicted to occur as a result of open pit dewatering (since the pit is mostly located within the Diamond Valley basin), but because that water would be pumped and consumptively used by the mine under the Proposed Action, it would not contribute to the available ground water in Diamond Valley. Fifty years after the end of operations under the Proposed Action (2105), the estimated available ground water in

Diamond Valley is predicted to be reduced by 65 afy as a result of pit lake capture and previous KVCWF pumping, relative to the No Action Alternative at that same point in time (Table 3.2-12). In 2105, a predicted increase in subsurface inflow to Diamond Valley of 42 afy (40 afy from Pine Valley and two afy from Kobeh Valley) results from pit lake capture. The captured water either would be stored in the pit lake or lost to evaporation, so the water would not contribute to the available ground water in Diamond Valley. The predicted mine-related reduction in available ground water in Diamond Valley within 50 years post-Project under the Proposed Action (up to 65 afy) is minor (0.1 percent) in comparison to the estimated consumptive use of ground water for agricultural purposes in Diamond Valley (55,800 afy) in 2009.

Table 3.2-12: Estimated Change in Annual Ground Water Budgets 50 Years Post-Project (2105) Under the Proposed Action, Relative to the No Action Alternative[1]

Budget Component	Antelope Valley	Diamond Valley	Kobeh Valley	Pine Valley (within the HSA)	Entire HSA
Change in Ground Water Inflow[2] (afy)					
Precipitation Recharge	0	0	0	0	0
Subsurface Inflow[4]	0	42 (40 from Pine Valley and 2 from Kobeh Valley)	189 (13 from Monitor Valley, 38 from Antelope Valley, and 138 from Pine Valley)	0	13 (from Monitor Valley to Kobeh Valley)
Net Change in Total Inflow	**0**	**42**	**189**	**0**	**13**
Change in Ground Water Outflow[2] (afy)					
Evapotranspiration[3,4]	-30	-65	-2,314	-35	-2,444
Net Ground Water Pumping	0	0	0	0	0
Subsurface Outflow[4]	38 (to Kobeh Valley)	0	2 (to Diamond Valley)	178 (40 to Diamond Valley and 138 to Kobeh Valley)	0
Net Change in Total Outflow	**8**	**-65**	**-2,312**	**143**	**-2,444**

[1] Estimation based on sources of data and methods described in Montgomery et al. (2010), including results from the calibrated numerical ground water model.

[2] Positive values indicate increase and negative values indicate decrease in water budget component or in net change in total inflow and outflow.

[3] Includes ET from phreatophyte areas and evaporation from playas and spring discharge.

[4] Source: Montgomery et al. (2010), Table 4.4-7.

The quantity of ground water leaving the HSA by subsurface flow and discharging into northern Pine Valley (the only location of subsurface outflow from the HSA) is not predicted to change significantly as a result of mine dewatering and KVCWF pumping.

- **Impact 3.2.3.3-4:** Ground water flow modeling indicates that there could be up to approximately a 25 percent decrease in **ET** of ground water in Kobeh Valley due to phreatophyte plant reduction resulting from temporary mine-induced drawdown.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.2.3.3-5:** Ground water flow modeling indicates that there could be a time-varying net change (decrease or increase) in the available ground water in Diamond Valley that is due solely to effects of the Proposed Action by the end of mining and milling operations and for at least 50 years post-Project; however, the magnitude of the predicted changes are less than 0.1 percent, compared to the overall ground water budget for Diamond Valley.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Consumptive Losses

Open pit dewatering and KVCWF pumping under the Proposed Action would constitute a combined maximum consumptive water use of 11,300 afy during the 44-year period of mining and milling operations. This consumptive use would cease at the end of that time period. After mining operations cease and the pit lake begins to fill, some pit lake water would be consumptively lost due to evaporation. The evaporative loss would increase over time with the increasing pit lake stage and water surface area after mine closure, but it would be divided between the various sources of water filling the pit (i.e., direct precipitation, pit-area runoff, and ground water inflow). For the Proposed Action after 100 years of pit filling, the consumptive loss of ground water due to pit lake evaporation is predicted to be approximately 165 gpm **(266 afy)** (Figure 3.2.22); after 800 years of pit filling a steady, long-term ground water loss of approximately 100 gpm (161 afy) is predicted. At all times during the simulated recovery period (through 1,580 years after mining and milling operations cease), including at final equilibrium, the hydraulic gradients are inward toward the pit in all directions, indicating that the pit consistently acts as a hydraulic sink during and after mine closure (Montgomery et al. 2010). The 161 afy is less than 0.1 percent of the water budget for Kobeh and Diamond Valleys combined.

The Pine Valley, Diamond Valley, and Kobeh Valley hydrographic areas are classified as designated basins by the NDWR and the withdrawal and use of ground water is regulated. Evaporative losses of approximately 161 afy may be treated as a consumptive use and accounted for as a water right at the discretion of the Nevada State Engineer. The resulting annual volume of water is comparable to the annual water use allowed for a land parcel of equivalent area placed under irrigation.

- **Impact 3.2.3.3-6:** Consumptive use of water during mining and milling operations would support a beneficial use and would not be expected to adversely impact water resources. Long-term consumptive use of ground water by evaporation from the pit lake surface is predicted to be approximately 100 gpm (161 afy) and would continue in perpetuity. This consumptive loss would only occur under the Proposed Action (and the Off-Site Transfer of Ore Concentrate for Processing Alternative and the Slower, Longer Project Alternative), and so represents a negative impact compared to the No Action Alternative.

  Significance of the Impact: Impacts during mining and milling operations are less than significant. After those operations cease, direct impacts of pit lake evaporation do not result in significant impacts.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Potential Impacts Due to Subsidence

The land surface above an aquifer has the potential to subside when ground water is removed from an aquifer composed of unconsolidated fine-grained sediment, which undergoes consolidation due to the reduction in fluid pressure associated with fluid loss. The most extensive subsidence typically occurs in unconsolidated material containing fine-grained sediments that are interbedded with sand and gravel aquifers. No subsidence would occur due to dewatering of the bedrock aquifers because the rock is generally competent (load bearing). The amount of consolidation is greater in the fine-grained sediments (clays) than in the coarser sand and gravel because of the more collapsible structure of clay beds and because clays contain more fluid per unit volume. When the pressure is reduced by the withdrawal of ground water by dewatering, unconsolidated materials undergo compaction, which is often irreversible. Typically, only a small part of the compression is reversible during ground water level recovery.

An analysis of potential impacts due to subsidence was performed using the Interbed-Storage Package for MODFLOW (Leake and Prudic 1991) along with ground water flow modeling of the No Action Alternative and Cumulative Action Scenarios (described above in Section 3.2.3.3.3). The Proposed Action predicted subsidence was determined using the same procedure that was used to determine water-table drawdown under the Proposed Action (i.e., the No Action Alternative subsidence results were subtracted from the Cumulative Action Scenario results), and the predicted Proposed Action subsidence is presented relative to existing (2009) conditions. The modeled interbed-storage parameters were calibrated to the distribution of subsidence interpreted from InSAR data for the main agricultural area in Diamond Valley from 1992 to 2000, as described in Section 3.2.2.6.6. The hydrogeological characteristics of Diamond and Kobeh Valleys are very similar (Harrill 1968; Tumbusch and Plume 2006). Both valleys contain thick (greater than 3,000 feet) sections of basin fill, much of it related to repeated cycles of lacustrine deposition during the late Cenozoic. It is therefore reasonable to infer that the Kobeh Valley basin-fill aquifer system's response to pumping in the KVCWF area would be similar to that presently occurring in Diamond Valley. Diamond Valley thus provides a useful analogue for estimating future potential impacts due to increased pumping in Kobeh Valley under the Proposed Action (Bell 2008).

The numerical model shows that under the Proposed Action, subsidence of up to approximately 2.5 feet would occur in the northern part of the KVCWF area (Figure 3.2.23). The projected lateral extent of subsidence greater than one-half-foot is approximately four miles in radius and is centered on the northern part of the well field area. There is no other predicted land subsidence due to the effects of mine pit dewatering or KVCWF pumping under the Proposed Action within the HSA.

Potential for Changes to Aquifer Productivity

The greatest potential for permanent deformation would occur in the finer grained sediments (clays and silty clays) that are not the primary water-bearing materials in the basin-fill aquifer of Kobeh Valley. The result would be a slight loss in aquifer interbed storage, but no noticeable loss in aquifer productivity of water supply wells. Thus, the potential impacts to the aquifer due to subsidence under the Proposed Action, if any, would be localized and are not considered significant.

- **Impact 3.2.3.3-7**: A small change in aquifer characteristics is expected to result from compaction of the aquifer materials. Ground subsidence of greater than one-half-foot is projected to extend approximately four miles quasi-radially from the center of subsidence effects in the northern part of the KVCWF area, and a maximum subsidence of approximately 2.5 feet is projected in a small part of that central area. The subsidence would result primarily from a permanent reduction in porosity of the finer grained sediments (clays and silty clays), which are not the primary water-bearing materials in the basin-fill aquifer.

  Significance of the Impact: The potential for the Kobeh Valley basin-fill aquifer to transmit or store water is not expected to be significantly impacted.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Potential for Significant Land Surface Alteration

Consolidation of sediments that results in subsidence could also produce changes at the land surface. As noted above, ground subsidence of approximately 2.5 feet would occur in a small part of the northern KVCWF area, and subsidence of up to one-half-foot is projected to extend approximately four miles from the center of subsidence effects in the northern well field area. If the future subsidence is smoothly distributed (as simulated by the MODFLOW-based model and the Interbed-Storage Package), it would not be noticeable because the average slopes of the land surface would mask any effects.

However, subsidence is not always smoothly distributed and irregularities in subsidence may occur, which leads to the potential for ground water withdrawals to induce fissures in the basin-fill deposits. Such fissures, thought to be induced by subsidence, have been observed and studied in Crescent Valley (adjacent to Pine Valley on the west side of the Cortez Mountains in the northwest part of the HSA), as documented in BLM (2004). Newly induced fissuring in the basin-fill deposits has the potential to alter surface drainage by causing ponding adjacent to surface breaks, or by deflecting surface runoff to a new course that follows the newly induced fissures. More important is the possibility of deflecting surface runoff directly into openings along the fissures. Fissures induced by subsidence are usually initially too narrow to be readily apparent, but may be substantially enlarged by erosion if exposed to significant overland flow. The erosion could result in deep, wide fissure gullies, which could be a hazard to people and animals. Fissure gullies could also damage roads or mining facilities.

In addition, such fissures may initially be open directly from the land surface to the aquifer, thus creating a shortcut for recharge to the aquifer. If any contaminants entered such a fissure, they would also be afforded a more direct route to the aquifer. Once subsidence stops, such fissures eventually naturally fill with sediment, but the natural process could take decades.

If differential subsidence induces fissuring in the basin-fill deposits, such fissures would be expected to occur in the areas of greatest subsidence (in the KVCWF area) and while ground water levels are falling (during pumping or soon thereafter). Hence, any potential impacts would likely be noticed prior to cessation of mine reclamation.

- **Impact 3.2.3.3-8:** Differential subsidence could result in the development of fissures, creating a potential to degrade waters of the state. Fissures could provide a preferential flow path for uncontained process fluids or chemical or hydrocarbon releases. Capture of surface runoff by fissures may form erosional fissure gullies, which represent a safety risk to wildlife, livestock, wild horses, and people.

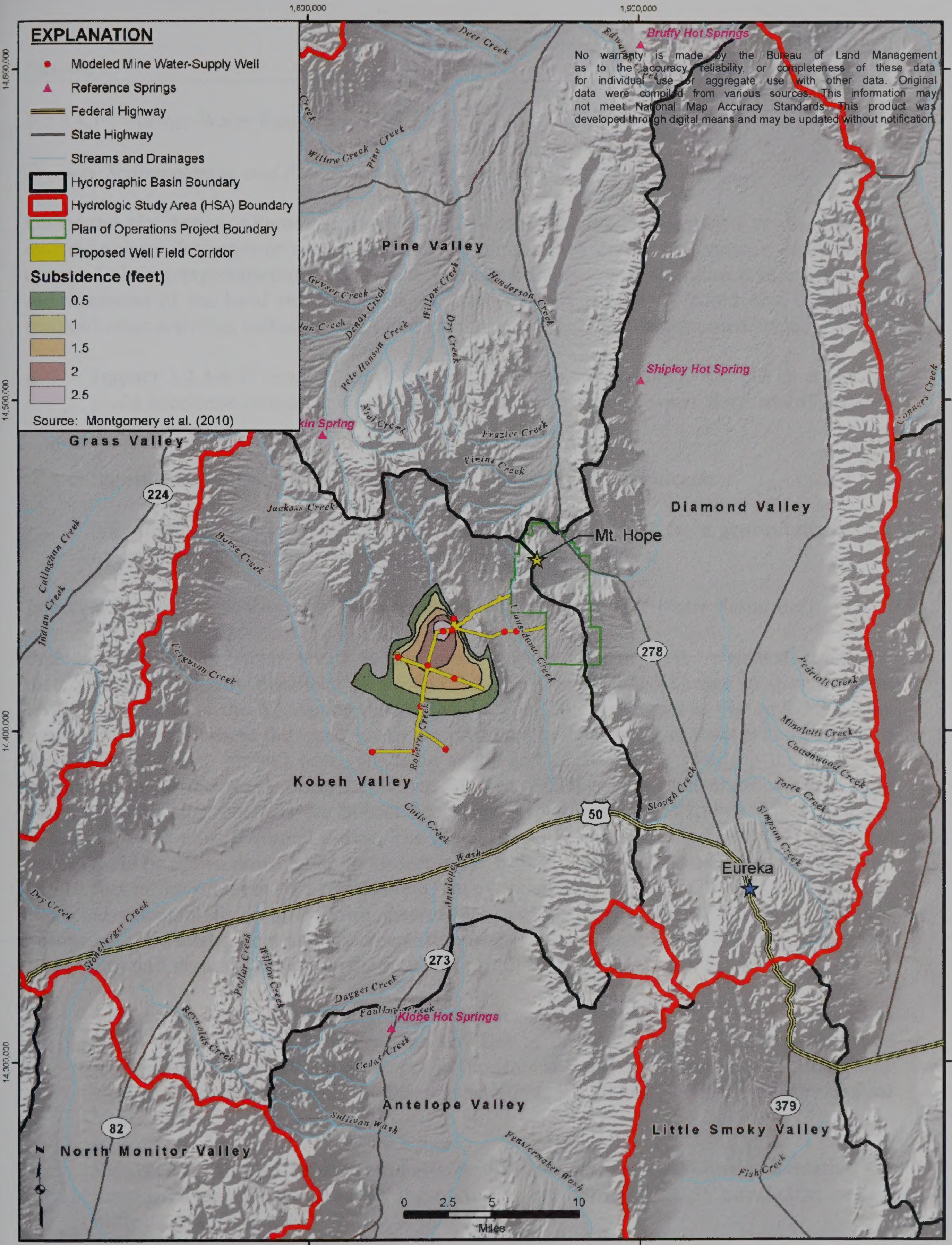
  Significance of the Impact: The impact would be significant if fissure gullies formed.

- **Mitigation Measure 3.2.3.3-8:** EML would be responsible for specifically monitoring for fissure gully development. If fissure gullies form, they would be filled in with clean, coarse-grained alluvium, with the intent of providing a rapid means of dissipation for any surface water entering the fissure and thereby reducing the propagation of the fissure through continued erosion. The fill material then would be seeded with a BLM-approved seed mix.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of Mitigation Measure 3.2.3.3-8 would be effective at mitigating the fissures that develop because they would be filled immediately. Any residual effects of fissure development would be fully mitigated during the life of the Project.

3.2.3.4 No Action Alternative

Under the No Action Alternative, the proposed Project would not be developed, and the associated impacts would not occur. Under this alternative, consumptive uses of ground water in the HSA basins would continue according to existing authorizations. The modeling assumptions regarding assumed future ground water withdrawals under the No Action Alternative are described in Section 3.2.3.2.2 and summarized in Table 3.2-7.



1,600,000
1,900,000
14,600,000
14,500,000
14,400,000
14,300,000
EXPLANATION
● Modeled Mine Water-Supply Well
▲ Reference Springs
Federal Highway
State Highway
Streams and Drainages
Hydrographic Basin Boundary
Hydrologic Study Area (HSA) Boundary
Plan of Operations Project Boundary
Proposed Well Field Corridor
Subsidence (feet)
0.5
1
1.5
2
2.5
Bruffy Hot Springs
Shipley Hot Spring
kin Spring
Klobe Hot Springs
Pine Valley
Diamond Valley
Grass Valley
Kobeh Valley
Antelope Valley
Little Smoky Valley
North Monitor Valley
Mt. Hope
Eureka
224
278
50
273
82
379
Deer Creek
Willow Creek
Pine Creek
Geyser Creek
Henderson Creek
Denay Creek
Willow Creek
Dry Creek
Pete Hanson Creek
Nel Creek
Frazier Creek
Fininy Creek
Jackass Creek
Horse Creek
Callaghan Creek
Indian Creek
Ferguson Creek
Lone Mountain Creek
Roberts Creek
Coils Creek
Slough Creek
Pedroli Creek
Minoletti Creek
Cottonwood Creek
Torre Creek
Simpson Creek
Conners Creek
Antelope Wash
Dry Creek
Stoneberger Creek
Peddler Creek
Willow Creek
Reynolds Creek
Dagger Creek
Faulkner Creek
Cedar Creek
Sullivan Wash
Fenstermaker Wash
Fish Creek
N
0
2.5
5
10
Miles

Source: Montgomery et al. (2010)

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BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Proposed Action Simulated Land Subsidence in Year 2055, Relative to 2009 Conditions

Figure 3.2.23

3.2.3.4.1 Surface Water Resources

Erosion, Sedimentation, and Flooding within Drainages

Under the No Action Alternative, there would be no mine-related alteration or diversion of existing natural drainages or washes that contain surface flow during high rainfall or snowmelt events. Existing exploration-related surface disturbance may cause an increase in erosion and sedimentation of the local surface drainages. Such impacts potentially could also occur as a result of other activities within the HSA that are not associated with the proposed Project.

- **Impact 3.2.3.4-1:** Grading, earth moving, diversion of drainages, and placement of fill could accelerate erosion and sedimentation, and alter surface-water flood runoff patterns in the future.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Effects of Ground Water Drawdown on Streams, Springs, and Surface Water Resources

Potential changes in water levels in the ground water system were evaluated using the methodology previously described in Section 3.2.3.2. The predicted change in ground water levels attributable to the No Action Alternative in Year 2055 is shown in Figure 3.2.23. This figure shows areas where the water levels are predicted to decrease over time in comparison to the existing baseline ground water elevation at the end of 2009, due solely to the simulated conditions under the No Action Alternative. By Year 2055, two distinct drawdown areas are predicted to develop: one near the Bobcat Ranch in the southwest part of Kobeh Valley, and one in the southern part of Diamond Valley. The ground water model results indicate that the ground water would be drawn down by up to 40 feet in the Bobcat Ranch area and by approximately up to 110 feet in the southern part of Diamond Valley, relative to existing (2009) conditions. The projected extent of future drawdown greater than ten feet encompasses one spring site and portions of five intermittent and ephemeral drainages in the Bobcat Ranch area, and numerous spring sites and stream drainages in the southern part of Diamond Valley.

- **Impact 3.2.3.4-2:** The future ground water drawdown (relative to existing conditions in 2009) is predicted to be more than ten feet at one spring site and portions of five intermittent and ephemeral drainages in the Bobcat Ranch area, and at numerous spring sites and stream drainages in the southern part of Diamond Valley by the end of Year 2055.

  Significance of the Impact: Impacts associated with the No Action Alternative are considered significant; however, these impacts are not under BLM jurisdiction and no mitigation is proposed.

3.2.3.4.2 Ground Water Resources

Lowering of the Water Table

Based on the ground water modeling, the assumed continued agricultural pumping in Kobeh and Diamond Valleys under the No Action Alternative would lower the water table in the basin-fill aquifers of those valleys by up to 40 feet and 110 feet in Year 2055, respectively, relative to existing (2009) conditions, as shown in Figure 3.2.2**4**. Continued pumping after that time may further increase the ground water drawdown in both areas, depending upon the magnitudes of the pumping rates.

Impacts to Ground Water Resources

There are numerous ground water users within the projected future drawdown area under the No Action Alternative (see Figure 3.2.3). Water rights associated with water-supply wells and surface water resources within the projected future drawdown area were included in the previously described inventory of water rights compiled for the EIS analysis (Section 3.2.2.7), but they are not individually addressed in this section for practical reasons; however, they are illustrated in Figure 3.2.2**4**. Notably, none of the non-EML-controlled water rights or wells predicted to be potentially impacted under the No Action Alternative are predicted to be impacted by the Proposed Action (or the Partial Backfill Alternative or the Off-Site Transfer of Ore Concentrate for Processing Alternative) leading to the conclusion that the impacts from the two alternatives are distinguishable.

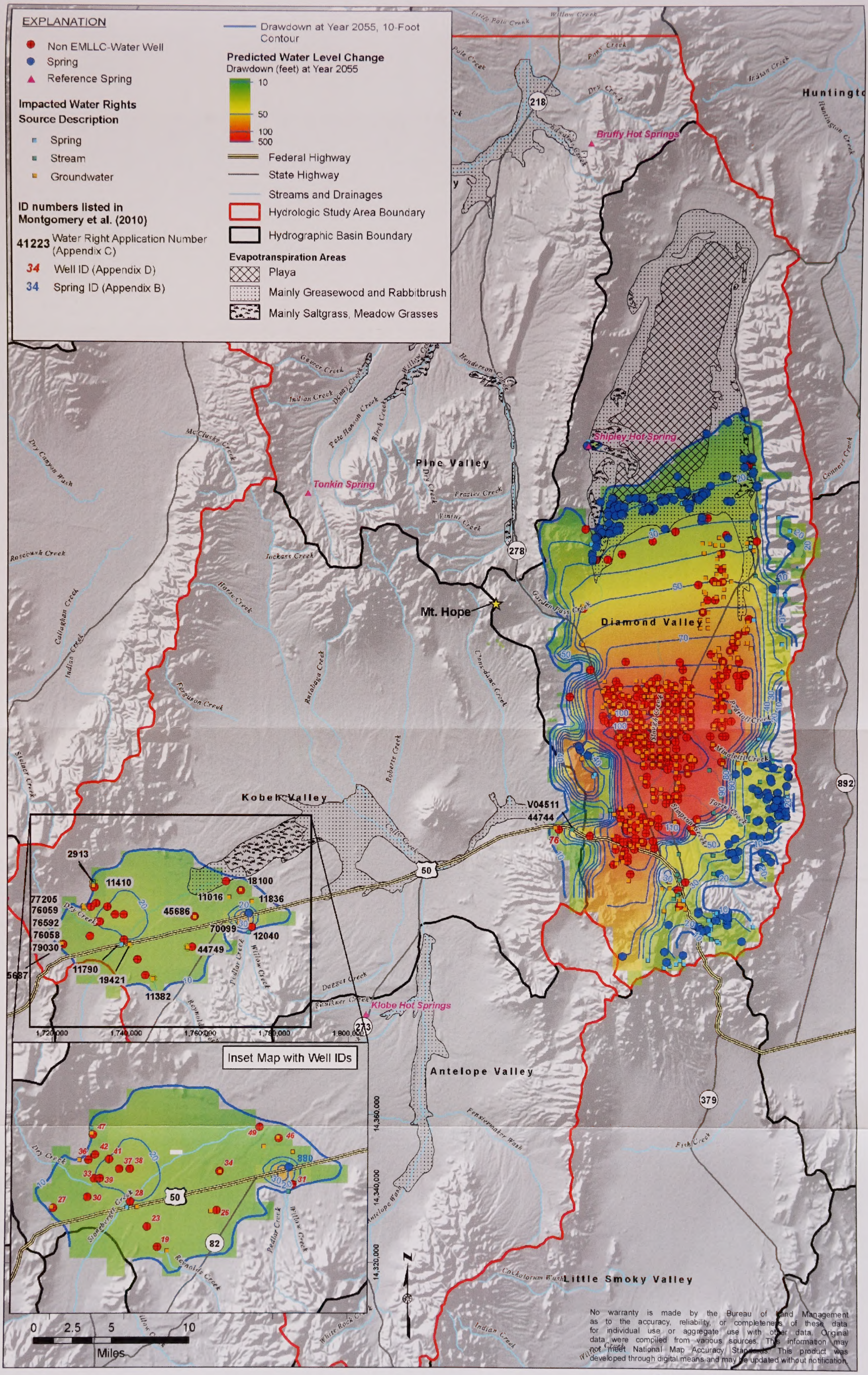
- **Impact 3.2.3.4-3:** The ground water drawdown is predicted to exceed ten feet at the locations of numerous active ground water rights controlled by third parties in the Bobcat Ranch area of Kobeh Valley and in the southern part of Diamond Valley by the end of Year 2055. None of these locations are predicted to be impacted by the Proposed Action, the Partial Backfill Alternative, or the Off-Site Transfer of Ore Concentrate for Processing Alternative.

  Significance of the Impact: Impacts associated with the No Action Alternative are considered significant; however, these impacts are not under BLM jurisdiction and no mitigation is proposed.

Impacts to Basin Water Budgets

The water balance for the ground water system within the HSA was estimated using the calibrated ground water flow model (Montgomery et al. 2010) and the consumptive use assumptions for the No Action Alternative, as described in Section 3.2.3.2. The estimated annual ground water inflow and outflow rates in Years 2055 and 2105 are summarized in Tables 3.2-13 and 3.2-14, respectively. The projected pattern of changes in the water balance for the No Action Alternative through the end of Year 2105 indicate that there would be a continued decrease in **ET** and further reduction in the available ground water stored in Diamond Valley.

- **Impact 3.2.3.4-4:** Ground water flow modeling indicates that there would be a continued decrease in **ET** of ground water in Diamond Valley resulting from expanded drawdown associated with continued agricultural pumping.


EXPLANATION
Non EMLLC-Water Well
Spring
Reference Spring
Impacted Water Rights Source Description
Spring
Stream
Groundwater
ID numbers listed in Montgomery et al. (2010)
41223 Water Right Application Number (Appendix C)
34 Well ID (Appendix D)
34 Spring ID (Appendix B)
Drawdown at Year 2055, 10-Foot Contour
Predicted Water Level Change
Drawdown (feet) at Year 2055
10
50
100
500
Federal Highway
State Highway
Streams and Drainages
Hydrologic Study Area Boundary
Hydrographic Basin Boundary
Evapotranspiration Areas
Playa
Mainly Greasewood and Rabbitbrush
Mainly Saltgrass, Meadow Grasses
Huntington
Bruffy Hot Springs
Shipley Hot Spring
Tonkin Spring
Pine Valley
Mt. Hope
Diamond Valley
Kobeh Valley
Antelope Valley
Little Smoky Valley
Klobe Hot Springs
V04511
44744
218
278
50
892
379
273
82
Inset Map with Well IDs
2913
11410
18100
11016
11836
45686
77205
76059
76592
76058
79030
70099
12040
44749
5687
11790
18421
11382
1,720,000
1,740,000
1,760,000
1,780,000
1,800,000
14,360,000
14,340,000
14,320,000
0
2.5
5
10
Miles
N

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Source: Montgomery et al. (2010).

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FILE NAME:	p1635_Fig3-2-X_Hydro_11i17i.mxd				

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

No Action Alternative Simulated Ground Water-Level Change in Year 2055, Relative to 2009 Conditions

Figure 3.2.24

Significance of the Impact: Impacts associated with the No Action Alternative are considered significant; however, these impacts are not under BLM jurisdiction and no mitigation is proposed.

Table 3.2-13: Simulated Ground Water Budgets for Individual Basins and the Entire HSA in 2055 Under the No Action Alternative[1]

Budget Component	Antelope Valley	Diamond Valley	Kobeh Valley	Pine Valley (within the HSA)	Entire HSA
Ground Water Inflow[2] (afy)					
Precipitation Recharge	4,100	21,400	13,200	34,900	73,600
Subsurface Inflow[5]	0	8,300 (5,900 from Pine Valley and 2,400 from Kobeh Valley)	5,100 (1,900 from Monitor Valley, 2,700 from Antelope Valley, and 500 from Pine Valley)	0	1,900 (from Monitor Valley to Kobeh Valley)
Net Total Inflow	**4,100**	**29,700**	**18,300**	**34,900**	**75,500**
Ground Water Outflow[2] (afy)					
Evapotranspiration[3,5]	1,400	9,100	15,000	17,100	42,600
Ground Water Pumping[5]	negligible	55,800	3,800	negligible	59,600
Subsurface Outflow[5]	2,700 (to Kobeh Valley)	0	2,400 (to Diamond Valley)	17,700 (5,900 to Diamond Valley, 500 to Kobeh Valley, and 11,300 to northern Pine Valley)	11,300 (from southern to northern Pine Valley)
Net Total Outflow	**4,100**	**64,900**	**21,200**	**34,800**	**113,600**

[1] Estimation based on sources of data and methods described in Montgomery et al. (2010), including results from the calibrated numerical ground water model.

[2] Values rounded to the nearest 100 afy.

[3] Includes ET from phreatophyte areas and evaporation from playas and spring discharge.

[4] Source: Montgomery et al. (2010), Table 4.1-5.

[5] Source: Montgomery et al. (2010), Table 4.4-5.

[6] Source: Montgomery et al. (2010), Figure 4.4-2.

Table 3.2-14: Simulated Ground Water Budgets for Individual Basins and the Entire HSA in 2105 Under the No Action Alternative[1]

Budget Component	Antelope Valley	Diamond Valley	Kobeh Valley	Pine Valley (within the HSA)	Entire HSA
Ground Water Inflow[2] (afy)					
Precipitation Recharge[4]	4,100	21,400	13,200	34,900	73,600
Subsurface Inflow[5]	0	8,700 (6,100 from Pine Valley and 2,600 from Kobeh Valley)	5,400 (2,100 from Monitor Valley, 2,700 from Antelope Valley, and 600 from Pine Valley)	0	2,100 (from Monitor Valley to Kobeh Valley)

Budget Component	Antelope Valley	Diamond Valley	Kobeh Valley	Pine Valley (within the HSA)	Entire HSA
Net Total Inflow	**4,100**	**30,100**	**18,600**	**34,900**	**75,700**
Ground Water Outflow[2] (afy)					
Evapotranspiration[3,5]	1,400	6,300	14,300	17,000	39,000
Net Ground Water Pumping[6]	negligible	55,800	3,800	negligible	59,600
Subsurface Outflow[5]	2,700 (to Kobeh Valley)	0	2,600 (to Diamond Valley)	18,000 (6,100 to Diamond Valley, 600 to Kobeh Valley, and 11,300 to northern Pine Valley)	11,300 (from southern to northern Pine Valley)
Total Outflow	**4,100**	**62,100**	**20,700**	**35,000**	**110,000**
Net Total Outflow	**0**	**-32,000**	**-2,100**	**-100**	**-34,300**

[1] Estimation based on sources of data and methods described in Montgomery et al. (2010), including results from the calibrated numerical ground water model.
[2] Values rounded to the nearest 100 afy.
[3] Includes ET from phreatophyte areas and evaporation from playas and spring discharge.
[4] Source: Montgomery et al. (2010), Table 4.1-5.
[5] Source: Montgomery et al. (2010), Table 4.4-5.
[6] Source: Montgomery et al. (2010), Figure 4.4-2.

- **Impact 3.2.3.4-5:** Ground water flow modeling indicates that there would be a further decrease in the available ground water stored in Diamond Valley due to continued agricultural pumping under the No Action Alternative, and that the declining trend in available ground water would persist until Year 2105 or longer depending upon future pumping rates.

  Significance of the Impact: Impacts associated with the No Action Alternative are considered significant; however, these impacts are not under BLM jurisdiction and no mitigation is proposed.

Consumptive Losses

For ground water modeling purposes, it was assumed that future consumptive use of ground water in Kobeh and Diamond Valleys would be constant at rates that are similar in magnitude to those experienced in recent years and persisting for the foreseeable future. The estimated future average annual rates of usage were 2,355 gallons per minute (3,800 afy) in Kobeh Valley and 34,630 gallons per minute (55,850 afy) in Diamond Valley, as listed in Tables 3.2-12 and 3.2-13. In reality, future pumping rates would not be constant over time and they may vary significantly from the modeling assumptions.

- **Impact 3.2.3.4-6:** Consumptive use of water for authorized agricultural irrigation, stock watering, mining and milling, or municipal uses constitute beneficial uses of water resources. However, the historical and existing (2009) rates of consumptive usage in Diamond Valley already appear to have impacted some water resources and may be unsustainable in the long term. Some of the pumping-related consumption of ground water in Diamond Valley is offset by the reduction in ground water loss due to less ET as the water table declines.

Significance of the Impact: Impacts associated with the No Action Alternative are not considered significant.

Potential Impacts Due to Subsidence

The basis for this potential impact and the assessment methodology are the same as described for the Proposed Action in Section 3.2.3.3.2; therefore, they will not be repeated here. The numerical model shows that under the No Action Alternative, future subsidence (i.e., relative to existing conditions in 2009) of up to approximately 13.5 feet would occur in the southern part of Diamond Valley by the end of Year 2055 (Figure 3.2.2**5**). The projected lateral extent of subsidence greater than one-half-foot extends approximately 13 miles to the north and south and five miles to the east and west from the center of maximum subsidence in southern Diamond Valley. There is also a small area of predicted subsidence of approximately one-half-foot magnitude along Slough Creek immediately west of Devils Gate in Kobeh Valley in Year 2055 under the No Action Alternative. There is no predicted land subsidence due to the effects of ground water withdrawals under the No Action Alternative anywhere else within the HSA.

Potential for Changes to Aquifer Productivity

The greatest potential for permanent deformation would occur in the finer grained sediments (clays and silty clays), which are not the primary water-bearing materials in the basin-fill aquifer of Diamond Valley. The result would be a loss in aquifer interbed storage and, presumably, some loss in aquifer productivity of water supply wells (given the magnitude of the projected maximum future subsidence).

- **Impact 3.2.3.4-7:** A change in aquifer characteristics is expected to result from compaction of the aquifer materials. Ground subsidence of greater than one-half-foot is projected to extend approximately 13 miles to the north and south and five miles to the east and west from the center of maximum subsidence (approximately 13.5 feet) in southern Diamond Valley. The subsidence would result primarily from a permanent reduction in porosity of the finer grained sediments (clays and silty clays), but some reduction in the porosity of the primary water-bearing materials in the basin-fill aquifer may also occur.

  Significance of the Impact: Impacts associated with the No Action Alternative are considered significant; however, these impacts are not under BLM jurisdiction and no mitigation is proposed.

Potential for Significant Land Surface Alteration

Consolidation of sediments that results in subsidence could also produce changes at the land surface. As noted above, ground subsidence of up to approximately 13.5 feet would occur in the southern part of Diamond Valley, and subsidence of up to one-half-foot is projected to extend approximately 13 miles to the north and south and five miles to the east and west from the center of maximum subsidence. If the future subsidence is not evenly distributed, the subsidence may induce fissuring or promote the formation of fissure gullies, which could alter surface drainage patterns, create a safety risk for animals and humans, or allow potential contaminants to rapidly enter the ground water system. The issues and risks associated with this potential impact are the same as described for the Proposed Action in Section 3.2.3.3.2; therefore, they will not be repeated here.

- **Impact 3.2.3.4-8:** Differential subsidence could result in the development of fissures, creating a potential to degrade waters of the state. Fissures could provide a preferential flow path for contaminants released at the ground surface to reach the ground water system. Capture of surface runoff by fissures may form erosional fissure gullies, which represent a safety risk to wildlife, livestock, wild horses, and people.

  Significance of the Impact: Impacts associated with the No Action Alternative are considered significant; however, these impacts are not under BLM jurisdiction and no mitigation is proposed.

3.2.3.5 Partial Backfill Alternative

The Partial Backfill Alternative (described in Section 2.2.2) would have the same potential water quantity impacts as the Proposed Action (Section 3.2.3.3) during the 33-year period of open pit mining, but the impacts would differ after mining and pit dewatering cease in 2044. After dewatering ceases, a pit lake would form as surrounding ground water levels recover under the Proposed Action; under the Partial Backfill Alternative, the pit would be partially backfilled to eliminate the potential for a pit lake to form, and the backfill material would saturate as ground water levels recover. The pre-mining ground water elevation in the vicinity of the proposed open pit varies from northwest to southeast across the site from approximately 7,200 to 6,750 feet amsl. Under the Partial Backfill Alternative, the open pit would be backfilled to elevations that would be at least 100 feet above the sloping, pre-mining ground water surface, thus preventing any substantial evaporative ground water losses from that area, as well as allowing precipitation within the open pit to flow freely out of the open pit at the southeastern edge.

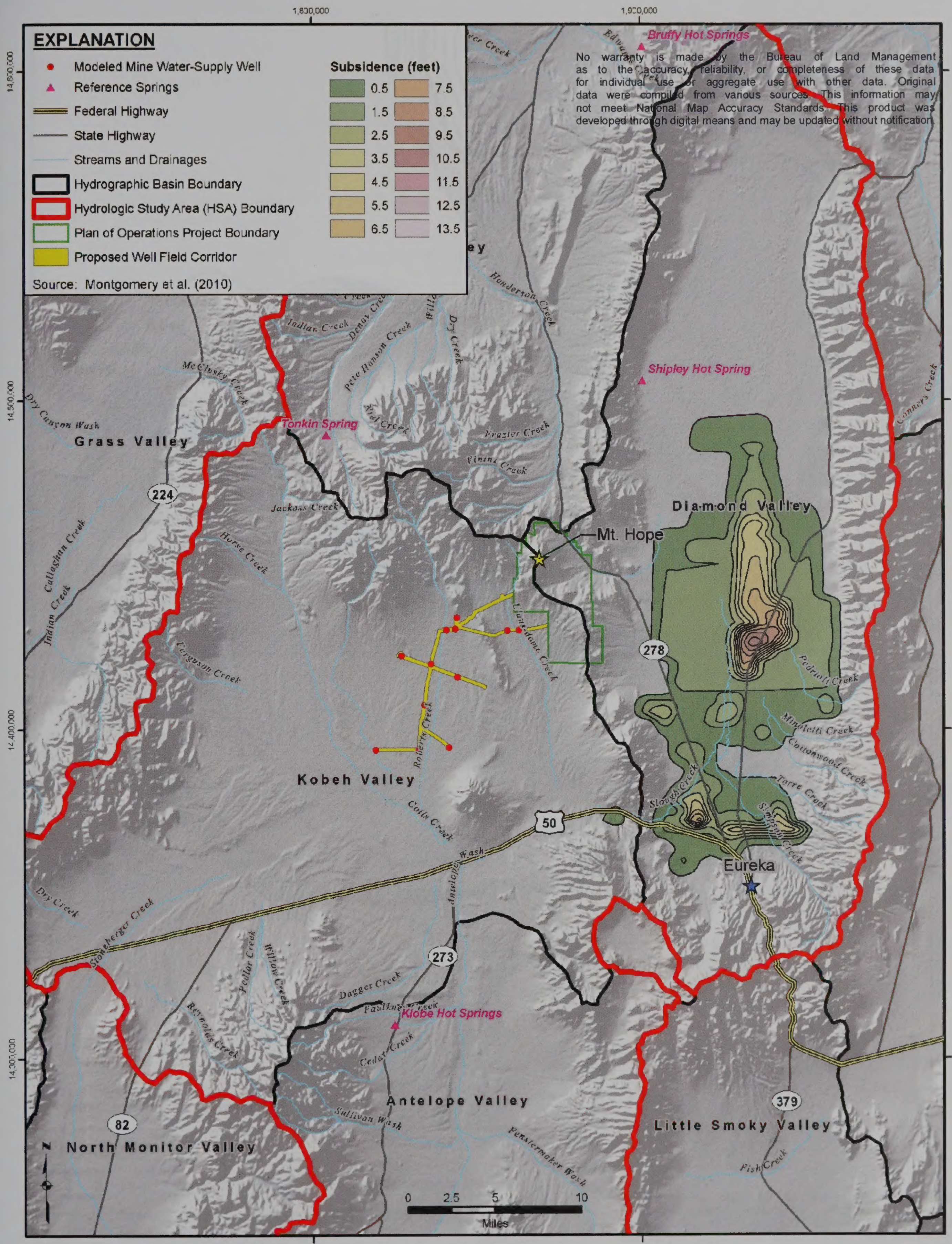
As ground water flows into the backfilled pit and the backfill becomes saturated there would be a corresponding ground water outflow from the backfilled pit soon after the end of mining. The onset of a well-defined flow-through condition would occur approximately 210 years after the end of dewatering and backfilling commences. Contours of the simulated ground water levels after 210 years of recovery are provided in Figure 3.2.**26**.

3.2.3.5.1 Surface Water Resources

Erosion, Sedimentation, and Flooding within Drainages

Even with the implementation of the Project BMPs, the potential impacts to surface drainages involving erosion, sedimentation, or alteration of flood runoff patterns under the Partial Backfill Alternative would occur, but would be proportionally less than for the Proposed Action, due to the smaller WRDFs as described in Section 3.2.3.3.1. This is primarily due to the placement of a large portion of the waste rock in the open pit and thus only the reclaimed surface of the backfill would be subject to erosion.

- **Impact 3.2.3.5-1:** Grading, earth moving, diversion of drainages, and placement of fill could accelerate erosion and sedimentation and alter surface-water flood runoff patterns during mining and post-closure.


1,800,000
1,900,000
14,600,000
14,500,000
14,400,000
14,300,000
EXPLANATION
● Modeled Mine Water-Supply Well
▲ Reference Springs
Federal Highway
State Highway
Streams and Drainages
Hydrographic Basin Boundary
Hydrologic Study Area (HSA) Boundary
Plan of Operations Project Boundary
Proposed Well Field Corridor
Subsidence (feet)
0.5
1.5
2.5
3.5
4.5
5.5
6.5
7.5
8.5
9.5
10.5
11.5
12.5
13.5
Source: Montgomery et al. (2010)
Bruffy Hot Springs
Shipley Hot Spring
Tonkin Spring
Klobe Hot Springs
Grass Valley
Kobeh Valley
Diamond Valley
Antelope Valley
Little Smoky Valley
North Monitor Valley
Mt. Hope
Eureka
224
278
50
273
82
379
Henderson Creek
Indian Creek
Denay Creek
Pete Hanson Creek
Dry Creek
McClusky Creek
Dry Canyon Wash
Frazier Creek
Fining Creek
Jackass Creek
Horse Creek
Callaghan Creek
Indian Creek
Ferguson Creek
Lone Mountain Creek
Roberts Creek
Coils Creek
Pedrioli Creek
Mindoletti Creek
Cottonwood Creek
Torre Creek
Slough Creek
Simpson Creek
Antelope Wash
Dry Creek
Stoneberger Creek
Pedlar Creek
Willow Creek
Reynolds Creek
Dagger Creek
Faulkner Creek
Cedar Creek
Sullivan Wash
Fenstermaker Wash
Fish Creek
Conners Creek
N
0 2.5 5 10
Miles

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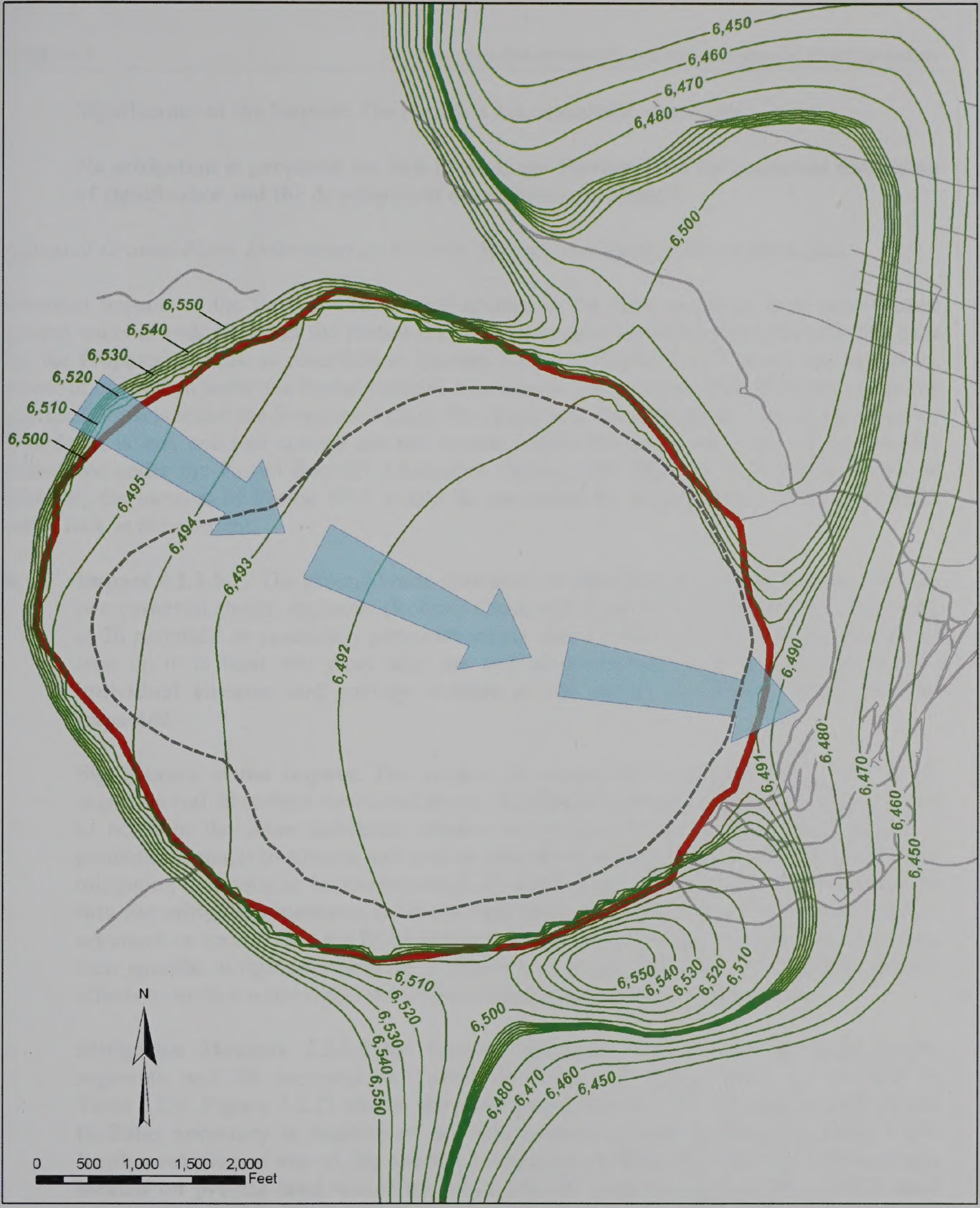
BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

No Action Alternative Simulated Land Subsidence in Year 2055, Relative to 2009 Conditions

Figure 3.2.25


6,450
6,460
6,470
6,480
6,500
6,550
6,540
6,530
6,520
6,510
6,500
6,495
6,494
6,493
6,492
6,490
6,491
6,480
6,470
6,460
6,450
6,550
6,540
6,530
6,520
6,510
6,510
6,520
6,530
6,540
6,550
6,500
6,480
6,470
6,460
6,450
N
0 500 1,000 1,500 2,000
Feet

EXPLANATION

🟥 Final Pit Extent

Direction of Groundwater Movement

Roads

Final Backfill Extent

6,500 —— Simulated Water Level Contours in feet above mean sea level

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BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Simulated Water Level Contours in the Backfill Area 210 Years After End of Open Pit Mining

Figure 3.2.26

Significance of the Impact: The impact is not considered significant.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Effects of Ground Water Drawdown on Streams, Springs, and Surface Water Resources

Potential impacts to the flow of streams and springs in the HSA resulting from mine-related ground water drawdown under the Partial Backfill Alternative would be proportionally less than for the Proposed Action, as described in Section 3.2.3.3.1. Figure 3.2.27 shows the maximum extent of drawdown under the Partial Backfill Alternative. There is very little difference from the potential impacts under the Proposed Action. However, near the open pit the maximum extent of drawdown is less and two springs are not located within the predicted extent of the ten-foot drawdown under the Partial Backfill Alternative (Spring sites **583** and 592) (Table 3.2-8). In addition, the location of Spring SP-7 would be uncovered by the placement of the Non-PAG waste rock in the open pit.

- **Impact 3.2.3.5-2:** The ground water drawdown is predicted to be more than ten feet for two perennial stream segments (Roberts Creek and South Fork of Henderson Creek) and at 2**0** perennial or potentially perennial spring sites (Table 3.2-8) for varying periods of time up to at least 400 years after the end of mining and milling operations. **Other individual streams and springs outside of the model predictions could also be impacted.**

  Significance of the Impact: The impacts are potentially significant at the two stream segments and 2**0** springs mentioned above. Although significant impacts are not predicted to occur in the other individual streams or springs in the HSA, the uncertainty of predicting impacts to streams and springs indicates a need for operational monitoring and mitigation measures to be implemented. If **monitoring, which has been incorporated into the mitigation measure, indicates that** there are reduced flows in perennial stream segments or springs that the BLM determines can be attributed to the mining operation, then **specific** mitigation would be implemented, as described below. Potential adverse effects to surface water rights would be mitigated **under** NDWR **j**urisdiction.

- **Mitigation Measure 3.2.3.5-2a:** Specific mitigation for the two perennial stream segments and 2**0** perennial or potentially perennial spring sites are outlined in Table 3.2-9. **Figure 3.2.21 shows the anticipated location for the components of the facilities necessary to implement the mitigation measures outlined in Table 3.2-9. Implementation of any of the specific mitigation outlined in Table 3.2-9 for springs located on private land would be subject to the authorization of the private land owner. The site-specific evaluation of the effectiveness of this specific mitigation for each identified surface water resource within the mine-related ground water drawdown area is presented in Table 3.2-9. The site-specific measures include one or more methods identified in Mitigation Measure (3.2.3.5-2b). Similar methods (as identified in Table 3.2-9) would also be applied to streams and springs not identified in this analysis, if monitoring indicates that there are impacts that the BLM determines can be attributed to the mining operation.** Implementation of the mitigation outlined in Table **3.2-9** would result in up to **approximately 29.8** acres of additional surface disturbance associated with the pipeline construction and maintenance, **as well as the need for approximately 302 acre-feet of water that would at least initially come from EML's existing water rights if additional water rights have not yet been secured. This specific mitigation would be implemented, as determined by the BLM, based on the results of the monitoring outlined in this mitigation measure.** EML would implement the water monitoring provisions outlined in Section 2.1.15 and Appendix **C** to track the drawdown associated with the open pit dewatering and ground water production activities. In addition, EML would periodically update the ground water flow as determined by the BLM. EML would be responsible for monitoring and annual reporting of changes in ground water levels and surface water flows prior to and during operation, and for a period of up to 30 years in the post-mining and milling phase. **The reports would be in a format and with a content that is acceptable to the BLM. The monitoring outlined in Appendix C and required in this mitigation measure would be used to document the effectiveness of the implemented specific mitigation activities. In addition, the BLM has the ability to require the implementation of additional mitigation measures if the initial implementation is unsuccessful.**

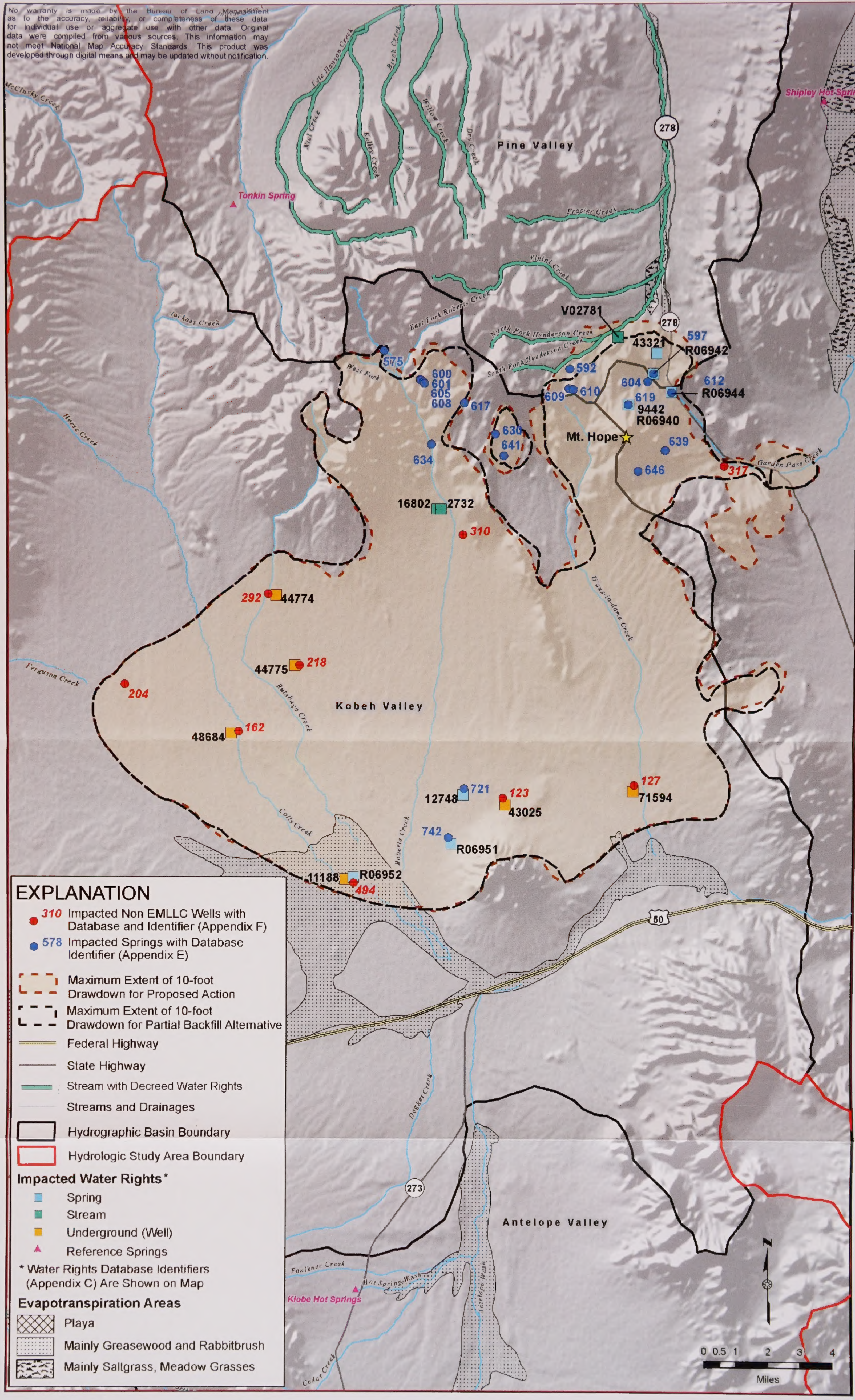
- **Mitigation Measure 3.2.3.5-2b**: If monitoring (Mitigation Measure 3.2.3.5-2a) indicates that flow reductions of perennial surface waters are occurring and that these reductions are likely the result of mine-induced drawdown, the following measures would be implemented:

  1. The BLM would evaluate the available information and determine whether mitigation is required.

  2. If mitigation would be required by the BLM for BLM-administered resources, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted perennial water resource(s). Potential adverse effects to surface water rights would be mitigated **under** NDWR jurisdiction**, as well as potential need for additional BLM permit acquisition activities and NEPA analysis**.

     The mitigation plan would be submitted to the BLM identifying the excess amount of drawdown or drawdown impacts to surface water resources. Mitigation would depend on the actual impacts, site-specific conditions, and historical use and could include a variety of measures (e.g., flow augmentation, on-site, or off-site improvements). Methods to enhance or replace the impacted perennial water resources include, but are not limited to, the following:

     - Modification, **including cessation,** of pumping distribution in the water supply well field;
     - Injection to confine the drawdown cone;
     - Installation of a water-supply pump in an existing well (e.g., monitoring well);
     - Installation of a new water production well;
     - Piping from a new or existing source;
     - Installation of a guzzler;


Pine Valley
Kobeh Valley
Antelope Valley
Mt. Hope
Tonkin Spring
Shipley Hot Spring
Klobe Hot Springs
McClusky Creek
Pete Hanson Creek
Birch Creek
Willow Creek
Nigl Creek
Kelley Creek
Dry Creek
Frazier Creek
Vinini Creek
East Fork Roberts Creek
North Fork Henderson Creek
South Fork Henderson Creek
West Fork
Tyrolean Creek
Horse Creek
Ferguson Creek
Bulnkaya Creek
Coils Creek
Roberts Creek
Garden Pass Creek
Dugout Creek
Faulkner Creek
Hot Springs Wash
Cedar Creek
Antelope Wash
278
50
273
V02781
43321
597
R06942
592
604
612
R06944
609
610
619
9442
R06940
575
600
601
605
608
617
630
641
634
639
646
317
16802
2732
310
292
44774
44775
218
204
48684
162
721
12748
123
43025
127
71594
742
R06951
11188
R06952
494
EXPLANATION
310 Impacted Non EMLLC Wells with Database and Identifier (Appendix F)
578 Impacted Springs with Database Identifier (Appendix E)
Maximum Extent of 10-foot Drawdown for Proposed Action
Maximum Extent of 10-foot Drawdown for Partial Backfill Alternative
Federal Highway
State Highway
Stream with Decreed Water Rights
Streams and Drainages
Hydrographic Basin Boundary
Hydrologic Study Area Boundary
Impacted Water Rights*
Spring
Stream
Underground (Well)
Reference Springs
* Water Rights Database Identifiers (Appendix C) Are Shown on Map
Evapotranspiration Areas
Playa
Mainly Greasewood and Rabbitbrush
Mainly Saltgrass, Meadow Grasses
N
0 0.5 1 2 3 4
Miles

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BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Comparison of Proposed Action and Partial Backfill Alternative with Respect to Springs, Non-EML Wells and Water Rights within the Composite Maximum Extent of the Ten-Foot Drawdown Contour

Figure 3.2.27

- Enhanced development of an existing seep or spring to promote additional flow;
- **Water hauling;**
- **Removal of piñon-juniper in impacted watersheds;** or
- Fencing or other protective measures for an existing seep to maintain flow.

3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures.

- **Mitigation Measure 3.2.3.5-2c**: The numerical ground water flow modeling indicates that some impacts to springs may occur after the end of mining and milling operations, when some of the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the closure process consistent with regulations and policy using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. If the BLM determines that the Project would impact perennial stream segments or spring sites in this post-operational phase, mitigation consisting of one or both of the following measures would be required:

  1. Installation of a well and pump at affected stream or spring locations to restore the historic yield of the affected surface water resource.

  2. Posting of an additional financial guarantee to provide for potentially affected water supplies in the future.

- **Effectiveness of Mitigation and Residual Effects:** Mitigation would be designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. The effectiveness of Mitigation Measure 3.2.3.5-2c, if implemented, is less certain since the mitigation would be many decades in the future. If initial implementation was not successful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. However, **this type of mitigation has been proven to be effective and** if measures used in Mitigation Measure 3.2.3.5-2b are implemented, then the measure should be effective at mitigating the impacts from reduced surface water flows. Over a long period of time (tens to **hundreds** of years) the effects to most surface water flows would diminish; however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity.

3.2.3.5.2 Ground Water Resources

Lowering of the Water Table

The dewatering associated with the proposed open pit mining under the Partial Backfill Alternative would lower the bedrock ground water elevations by approximately 2,250 feet in the vicinity of the open pit during mining operations. At the same time, and continuing for 12 years after the end of pit dewatering, pumping in the KVCWF for process water supply would lower the water table in the basin-fill and bedrock aquifers of central Kobeh Valley and the southern part of the Roberts Mountains. Based on numerical ground water flow modeling, the expected amount of drawdown near the center of the KVCWF is approximately 120 feet after 44 years of pumping under the Proposed Action (Montgomery et al. 2010). The ground water levels near the open pit and the KVCWF would begin to recover immediately after Project-related dewatering and pumping cease. The Local Model was used to evaluate the ground water recovery in the backfilled pit under the Partial Backfill Alternative (Figure 3.2.2**8**).

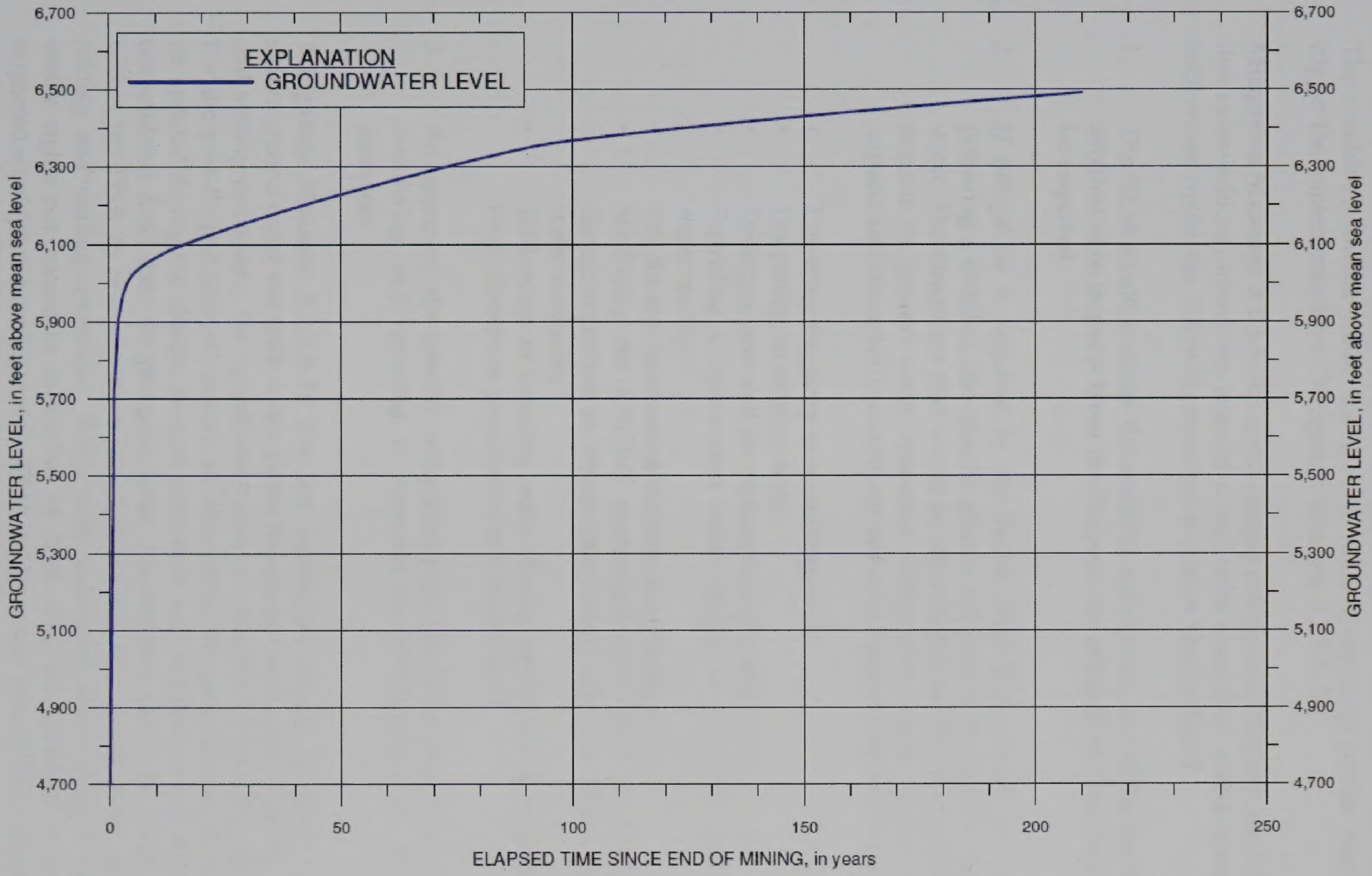
Impacts to Ground Water Resources

Potential impacts to the ground water and thus the associated ground water users in the HSA resulting from mine-related ground water drawdown under the Partial Backfill Alternative would be the same as for the Proposed Action, as described in Section 3.2.3.3.2 (Montgomery 2010). Therefore, they are not repeated here.

- **Impact 3.2.3.5-3:** The ground water drawdown is predicted to exceed ten feet at the locations of seven wells with associated **active** ground water **use with water** rights.

  Significance of the Impact: Impacts to the seven wells with associated **active** ground water **use with water** rights listed in Table 3.2-10 are potentially significant until such time as the ground water level recovers to less than ten feet of drawdown, which is predicted to be less than 100 years post-Project in all cases. The impacts would become less than significant after implementation of the mitigation measures described below. Potential adverse effects to ground water rights would be mitigated **under** NDWR jurisdiction. **Therefore no mitigation measures are proposed by the BLM for ground water rights. Section 3.26 includes suggested mitigation outside the BLM's jurisdiction for water rights.**

- **Mitigation Measure 3.2.3.5-3a:** For the seven wells with associated **active** ground water **use with water** rights EML would assess the distance of the screened interval and the pumping below the ground water table. If that difference is greater than maximum predicted drawdown, then EML would pay the water right holder for the increase in pumping costs based on historical usage. If the difference is greater than ten feet, then EML would pay for either the lowering of the pump to a depth greater than the maximum drawdown in the well, or the completion of a new well with the screened depth greater than the maximum predicted drawdown and pay the water right holder for the increase in pumping costs based on historic usage. In addition, EML would implement the water monitoring provisions outlined in Section 2.1.15 and in Appendix **C**. If, through implementation of the water monitoring, it is determined that there are impacts to wells with associated **active** ground water **use with water** rights attributable to the Project,



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DESIGN: EMLLC	DRAWN: GSL	REVIEWED: RFD
CHECKED: -	APPROVED: RFD	DATE: 08/03/2012

FILE NAME: p1635_Fig3-2-28_GroundwaterLevel_graph.mxd

BUREAU OF LAND MANAGEMENT
MOUNT HOPE PROJECT

DRAWING TITLE:

Projected Ground Water Level in Center of Pit Backfill

Figure 3.2.28

whether predicted or not, then the following mitigation measures would be implemented. The combined surface water and ground water monitoring results would be used to trigger the implementation of Mitigation Measure 3.2.3.5-3b.

- **Mitigation Measure 3.2.3.5-3b**: If monitoring (Mitigation Measure 3.2.3.5-3a) indicates that mine-induced drawdown impacts a well with associated **active ground** water **use with water** rights, the following measures would be implemented:

  1. The BLM would evaluate the available information and **if the drawdown can be attributed to impacts from the Project, the mitigation described above would be required**.

  2. If mitigation is required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted ground water. The mitigation plan would be submitted to the BLM identifying drawdown impacts to ground water resources. Mitigation would depend on the actual impacts and site-specific conditions and could include the following:

     - Lowering the pump in an existing well;
     - Deepening an existing well;
     - Drilling a new well for replacement of water supply;
     - Providing a replacement water supply of equivalent yield and general water quality;
     - Pay for any incremental increase in pumping costs;
     - Modifying the KVCWF pumping regime (well locations and/or rates) during operations to reduce draw down in the area of the impacted ground water resources;
     - Infiltrating or injecting water during operations at strategic locations to limit drawdown propagation in certain areas.

  3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures.

- **Mitigation Measure 3.2.3.5-3c**: For any significant impacts to wells with associated **active** ground water **use with water** rights that do not occur until after the end of mining and milling operations, the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the closure process consistent with regulations and policies using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. Wells **with** associated active ground water **use with water** rights not owned or controlled by EML that are indicated to be significantly impacted would then be mitigated by **EML using** one or more of the following measures, as directed by the BLM or the appropriate regulatory agency:

  1. Installation of a deeper well and pump at affected locations to restore the historical yield of the well (including incremental increase in pumping costs).

2. Posting of a funding mechanism to provide for potential future impacts to potentially affected water **sources**.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.2.3.5-3b and the use of any of the options outlined above would be effective at mitigating the impacts to **wells with associated active** ground water **use with water** rights. Mitigation would be designed to address the specific ground water source that is affected, which enhances the effectiveness of the mitigation. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by providing financial compensation or ensuring that the water is made available, and because the measures **would** be reviewed and assessed by the BLM. If initial implementation was not successful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. Any residual effects to ground water rights would be fully mitigated and over a long period of time (tens to **hundreds** of years) the drawdown effects would fully diminish, except in the vicinity of the open pit where the effects would be in perpetuity.

Impacts to Basin Water Budgets

Potential impacts to water budgets of the basins in the HSA resulting from mine-related ground water withdrawals under the Partial Backfill Alternative would be very similar to those of the Proposed Action through the end of mine dewatering operations (Year 2044). At the end of open pit mining under the Partial Backfill Alternative, the pit would be partially backfilled to prevent the formation of a pit lake. As a result, the pit lake evaporation that would occur under the Proposed Action would not occur under the Partial Backfill Alternative. The recovery of ground water levels in the vicinity of the pit would be faster under the Partial Backfill Alternative than for the Proposed Action because less water from storage would be needed to fill the void spaces in the backfilled pit than would be needed to fill the open pit void space, and because there would be no ongoing evaporative losses from a lake surface during recovery under the Partial Backfill Alternative. The ground water elevations in the vicinity of the pit would ultimately recover to near the pre-mining levels under the Partial Backfill Alternative, whereas under the Proposed Action, the lake would act as a continual sink for ground water, resulting in a permanent drawdown of the water table locally around the open pit.

The estimated changes in annual ground water budgets under the Partial Backfill Alternative indicate that the mine-induced drawdown associated with pit dewatering and KVCWF pumping is predicted to result in a decrease in **ET** in all basins of the HSA. Most of the predicted decrease (95 percent at 50 years after the end of mine-related pumping) in **ET** within the HSA occurs in Kobeh Valley. The predicted water table drawdown in Kobeh Valley extends to the mapped phreatophyte areas northwest of Bean Flat and east of Lone Mountain (Figure 3.2.27). The predominant phreatophyte vegetation in these areas is greasewood. The simulated extinction depth for greasewood is 40 feet below the ground surface, and the ground water model results indicate that the magnitude of drawdown along the perimeter of these phreatophyte vegetation areas would exceed the extinction depth for some period of time (Montgomery et al. 2010). This could potentially lead to a **change in composition and percent cover** of phreatophyte plants and an associated decrease in **ET** of ground water, as reflected in the estimated water budget changes listed in Tables 3.2-15 and 3.2-16.

In the final year of operations under the Partial Backfill Alternative (2055), the estimated available ground water in Diamond Valley is predicted to be reduced by 48 afy as a result of mine pit dewatering and KVCWF pumping, relative to the No Action Alternative at that same point in time (Table 3.2-15). An increase in subsurface inflow to Diamond Valley of 92 afy (31 afy from Pine Valley and 61 afy from Kobeh Valley) is also predicted to occur as a result of mine pit dewatering (since the open pit is mostly located within the Diamond Valley basin, but because that water would be pumped and consumptively used by the mine under the Partial Backfill Alternative, it would not contribute to the available ground water in Diamond Valley). Fifty years after the end of operations under the Partial Backfill Alternative (2105), the estimated available ground water in Diamond Valley is predicted to be reduced by 51 afy as a result of pit-lake capture and previous KVCWF pumping, relative to the No Action Alternative at that same point in time (Table 3.2-16). In 2105, a predicted increase in subsurface inflow to Diamond Valley of 65 afy (21 afy from Pine Valley and 44 afy from Kobeh Valley) results from flow-through in the backfilled pit. Thus, the modeling predicts a net increase of 14 afy in available ground water in Diamond Valley within 50 years post-Project under the Partial Backfill Alternative relative to the No Action Alternative.

Table 3.2-15: Estimated Change in Annual Ground Water Budgets in Final Year of Project (2055) Under the Partial Backfill Alternative, Relative to the No Action Alternative[1]

Budget Component	Antelope Valley	Diamond Valley	Kobeh Valley	Pine Valley (within the HSA)	Entire HSA
Change in Ground Water Inflow[2] (afy)					
Precipitation Recharge	0	0	0	0	0
Subsurface Inflow[4]	0	92 (31 from Pine Valley and 61 from Kobeh Valley)	179 (1 from Monitor Valley, 33 from Antelope Valley, and 145 from Pine Valley)	0	1 (from Monitor Valley to Kobeh Valley)
Net Change in Total Inflow	**0**	92	**179**	**0**	**1**
Change in Ground Water Outflow[2] (afy)					
Evapotranspiration[3]	-16	-48	-4,020	-11	-4,095
Net Ground Water Pumping	0	0	11,300	0	11,300
Subsurface Outflow	33 (to Kobeh Valley)	0	61 (to Diamond Valley)	179 (31 to Diamond Valley, 3 to North Pine Valley and 145 to Kobeh Valley)	-3
Net Change in Total Outflow	**17**	**-48**	**7,341**	**168**	**7,202**

[1] Estimation based on sources of data and methods described in Montgomery et al (2010) and Montgomery and Associates (2011), including results from the calibrated numerical ground water model.

[2] Positive values indicate increase and negative values indicate decrease in water budget component or in net change in total inflow and outflow.

[3] Includes ET from phreatophyte areas and evaporation from playas and spring discharge.

Table 3.2-16: Estimated Change in Annual Ground Water Budgets 50 Years Post-Project (2105) Under the Partial Backfill Alternative, Relative to the No Action Alternative[1]

Budget Component	Antelope Valley	Diamond Valley	Kobeh Valley	Pine Valley (within the HSA)	Entire HSA
Change in Ground Water Inflow[2] (afy)					
Precipitation Recharge	0	0	0	0	0
Subsurface Inflow[4]	0	65 (21 from Pine Valley and 44 from Kobeh Valley)	167 (14 from Monitor Valley, 38 from Antelope Valley, and 115 from Pine Valley)	0	14 (from Monitor Valley to Kobeh Valley)
Net Change in Total Inflow	**0**	**65**	**167**	**0**	**14**
Change in Ground Water Outflow[2] (afy)					
Evapotranspiration[3]	-30	-51	-2,305	-28	-2,414
Net Ground Water Pumping	0	0	0	0	0
Subsurface Outflow	38 (to Kobeh Valley)	0	44 (to Diamond Valley)	145 (21 to Diamond Valley, 9 to North Pine Valley, and 115 to Kobeh Valley)	-9
Net Change in Total Outflow	**8**	**-51**	**-2,261**	**117**	**-2,423**

[1] Estimation based on sources of data and methods described in Montgomery et al. (2010) and Montgomery & Associates (2011), including results from the calibrated numerical ground water model.

[2] Positive values indicate increase and negative values indicate decrease in water budget component or in net change in total inflow and outflow.

[3] Includes ET from phreatophyte areas and evaporation from playas and spring discharge.

The quantity of ground water leaving the HSA by subsurface flow and discharging into northern Pine Valley (the only location of subsurface outflow from the HSA) is predicted to decrease, relative to the No Action Alternative, as a result of mine dewatering and KVCWF pumping under the Partial Backfill Alternative from three afy at the end of the Project to nine afy at 50 years post-Project.

- **Impact 3.2.3.5-4**: Ground water flow modeling indicates that there could be up to an approximately 25 percent decrease in **ET** of ground water in Kobeh Valley due to **a change in** phreatophyte **composition and percent cover** resulting from temporary mine-induced drawdown.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.2.3.5-5:** Ground water flow modeling indicates that there could be a time-varying net change (decrease or increase) in the available ground water in Diamond Valley that is due solely to effects of the Partial Backfill Alternative by the end of mining and milling operations and for at least 50 years post-Project; however, the magnitude of the projected changes are less than 0.1 percent compared to the overall ground water budget for Diamond Valley.

Significance of the Impact: The impact is not considered significant.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Consumptive Losses

Pit dewatering and KVCWF pumping under the Partial Backfill Alternative would constitute a combined consumptive water use of 11,300 afy, on average, during the 44-year period of mining and milling operations. This consumptive use would cease at the end of that time period. After mining operations cease under the Partial Backfill Alternative, the backfilled material in the pit area would become saturated as ground water levels recover, but there would be no significant evaporative losses of ground water associated with that process.

- **Impact 3.2.3.5-6:** Consumptive use of water during mining and milling operations would support a beneficial use and would not be expected to adversely impact water resources. Long-term consumptive use of water by evaporation from the pit lake surface would not occur under the Partial Backfill Alternative, which is a positive impact compared to the Proposed Action and is a neutral impact compared to the No Action Alternative.

  Significance of the Impact: There is a positive impact compared to the Proposed Action and a neutral impact compared to the No Action Alternative. **Impacts during mining and milling operations are less than significant. After those operations cease, direct impacts of pit lake evaporation would not occur and would, therefore, not result in significant impacts.**

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Potential Impacts Due to Subsidence

Potential for Changes to Aquifer Productivity

Potential impacts to aquifer productivity resulting from dewatering-induced land subsidence under the Partial Backfill Alternative would be the same as for the Proposed Action, as described in Section 3.2.3.3.2. Therefore, they are not repeated here.

- **Impact 3.2.3.5-7:** A small change in aquifer characteristics is expected to result from compaction of the aquifer materials. Ground subsidence of greater than one-half-foot is projected to extend approximately four miles quasi-radially from the center of subsidence effects in the northern part of the KVCWF area, and a maximum subsidence of approximately 2.5 feet is projected in a small part of that central area. The subsidence would result primarily from a permanent reduction in porosity of the finer grained sediments (clays and silty clays), which are not the primary water-bearing materials in the basin-fill aquifer.

Significance of the Impact: The potential for the Kobeh Valley basin-fill aquifer to transmit or store water is not expected to be significantly impacted.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Potential for Significant Land Surface Alteration

Potential impacts to ground surface conditions (fissuring or alteration of drainage patterns) resulting from dewatering-induced land subsidence under the Partial Backfill Alternative would be the same as for the Proposed Action, as described in Section 3.2.3.3.2. Therefore, they are not repeated here.

- **Impact 3.2.3.5-8:** Differential subsidence could result in the development of fissures, creating a potential to degrade waters of the state. Fissures could provide a preferential flow path for uncontained process fluids or chemical or hydrocarbon releases. Capture of surface runoff by fissures may form erosional fissure gullies, which represent a safety risk to wildlife, livestock, wild horses, and people.

  Significance of the Impact: The impact would be significant if fissure gullies formed.

- **Mitigation Measure 3.2.3.5-8:** As part of the comprehensive water resources monitoring program (Mitigation Measure 3.2.3.5-2a), EML would be responsible for specifically monitoring for fissure gully development. If fissure gullies form, they would be filled in with clean, coarse-grained alluvium, with the intent of providing a rapid means of dissipation for any surface water entering the fissure and thereby reducing the propagation of the fissure through continued erosion. The fill material then would be seeded with a BLM-approved seed mix.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.2.3.5-8 would be effective at mitigating the fissures that develop. Any residual effects of fissure development would be fully mitigated during the life of the Project.

3.2.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

The Off-Site Transfer of Ore Concentrate for Processing Alternative (described in Section 2.2.3) would have the same potential water quantity impacts as the Proposed Action (Section 3.2.3.3) throughout the entire 44-year period of mining and milling operations and during the post-Project recovery period. There would be no reduction in the pit dewatering rates, the process-water supply requirements, or the pit lake evaporation rates under the Off-Site Transfer of Ore Concentrate for Processing Alternative, relative to the Proposed Action.

3.2.3.6.1 Surface Water Resources

Erosion, Sedimentation, and Flooding within Drainages

Even with the implementation of the Project BMPs, the potential impacts to surface drainages involving erosion, sedimentation, or alteration of flood runoff patterns under the Off-Site Transfer of Ore Concentrate for Processing Alternative would occur and would be the same as for the Proposed Action, as described in Section 3.2.3.3.1. Therefore, they are not repeated here.

- **Impact 3.2.3.6-1:** Grading, earth moving, diversion of drainages, and placement of fill could accelerate erosion and sedimentation and alter surface water flood runoff patterns during mining and post-closure.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Effects of Ground Water Drawdown on Streams, Springs, and Surface Water Resources

Potential impacts to the flow of streams and springs in the HSA resulting from mine-related ground water drawdown under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as for the Proposed Action, as described in Section 3.2.3.3.1. Therefore, they are not repeated here.

- **Impact 3.2.3.6-2:** The ground water drawdown is predicted to be more than ten feet for two perennial stream segments (Roberts Creek and South Fork of Henderson Creek) and at 22 perennial or potentially perennial spring sites (Table 3.2-8) for varying periods of time up to at least 400 years after the end of mining and milling operations. **Other individual streams and springs outside of the model predictions could also be impacted.**

  Significance of the Impact: The impacts are potentially significant at the two stream segments and 22 springs mentioned above. Although significant impacts are not predicted to occur in the other individual streams or springs in the HSA, the uncertainty of predicting impacts to streams and springs indicates a need for operational monitoring and mitigation measures to be implemented. If **monitoring, which has been incorporated into the mitigation measures, indicates that there are** reduced flows in perennial stream segments or springs that the BLM determines can be attributed to the mining operation, then **specific** mitigation would be implemented, as described below. In addition, potential adverse effects to surface water rights would be mitigated **under** NDWR jurisdiction.

- **Mitigation Measure 3.2.3.6-2a:** Specific mitigation for the two perennial stream segments and 22 perennial or potentially perennial spring sites are outlined in Table 3.2-9. **Figure 3.2.21 shows the anticipated location for the components of the facilities necessary to implement the mitigation measures outlined in Table 3.2-9. Implementation of any of the specific mitigation outlined in Table 3.2-9 for springs**

located on private land would be subject to the authorization of the private land owner. The site-specific evaluation of the effectiveness of this specific mitigation for each identified surface water resource within the mine-related ground water drawdown area is presented in Table 3.2-9. The site-specific measures include one or more methods identified in Mitigation Measure (3.2.3.6-2b). Similar methods (as identified in Table 3.2-9) would also be applied to streams and springs not identified in this analysis, if monitoring indicates that there are impacts that the BLM determines can be attributed to the mining operation. Implementation of the mitigation outlined in Table **3.2-9** would result in up to **37.2** acres of additional surface disturbance associated with the **road and** pipeline construction and maintenance**, as well as the need for approximately 302 acre-feet of water that would at least initially come from EML's existing water rights if additional water rights have not yet been secured. The specific mitigation would be implemented, as determined by the BLM, based on the results of the monitoring that is also outlined in this mitigation measure.** EML would implement the water monitoring provisions outlined in Section 2.1.15 and Appendix **C** to track the drawdown associated with the open pit dewatering and water production activities. In addition, EML would periodically update the ground water flow model as determined by the BLM. EML would be responsible for monitoring and annual reporting of changes in ground water levels and surface water flows prior to and during operation, and for a period of up to 30 years in the post mining and milling phase. **The reports would be in a format and with a content that is acceptable to the BLM. The monitoring outlined in Appendix C and required in this mitigation measure would be used to document the effectiveness of the implemented specific mitigation activities. In addition, the BLM has the ability to require the implementation of additional mitigation measures if the initial implementation is unsuccessful.**

- **Mitigation Measure 3.2.3.6-2b:** If monitoring (Mitigation Measure 3.2.3.6-2a) indicates that flow reductions of perennial surface waters are occurring and that these reductions are likely the result of mine-induced drawdown, the following measures would be implemented:

  1. The BLM would evaluate the available information and determine whether mitigation is required.

  2. If mitigation would be required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted perennial water resource(s). Potential adverse effects to water rights would be mitigated **under** NDWR jurisdiction**, as well as potential need for additional BLM permit acquisition activities and NEPA analysis**. The mitigation plan would be submitted to the BLM identifying the excess amount of drawdown or drawdown impacts to surface water resources. Mitigation would depend on the actual impacts, site-specific conditions, and historical use and could include a variety of measures (e.g., flow augmentation, on-site or off-site improvements). Methods to enhance or replace the impacted perennial water resources include, but are not limited to the following:

- Modification, **including cessation,** of pumping distribution in the water supply well field;
- Injection to confine the drawdown cone;
- Installation of a water-supply pump in an existing well (e.g., monitoring well);
- Installation of a new water production well;
- Piping from a new or existing source;
- Installation of a guzzler;
- Enhanced development of an existing seep or spring to promote additional flow;
- **Water hauling;**
- **Removal of piñon-juniper in impacted watersheds;** or
- Fencing or other protective measures for an existing seep to maintain flow.

3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures.

- **Mitigation Measure 3.2.3.6-2c:** The numerical ground water flow modeling indicates that some impacts to springs may occur after the end of mining and milling operations, when some of the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the closure process consistent with regulations and policies using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. If the BLM determines that the Project would impact perennial stream segments or spring sites in this post-operational phase, mitigation consisting of one or both of the following measures would be required:

    1. Installation of a well and pump at affected stream or spring locations to restore the historic yield of the affected surface water resource.

    2. Posting of an additional financial guarantee to provide for potentially affected water supplies in the future.

- **Effectiveness of Mitigation and Residual Effects:** Mitigation would be designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. The effectiveness of Mitigation Measure 3.2.3.6-2c, if implemented, is less certain since it would be many decades in the future. If initial implementation was not successful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. However, **this type of mitigation has been proven to be effective and** if measures used in Mitigation

Measure 3.2.3.6-2b are implemented, then the measure should be effective at mitigating the impacts from reduced surface water flows. Over a long period of time (tens to **hundreds** of years) the effects to most surface water flows would diminish; however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity.

3.2.3.6.2 Ground Water Resources

Lowering of the Water Table

Impacts to Ground Water Resources

Potential impacts to the water resources and thus the associated ground water users in the HSA resulting from mine-related ground water drawdown under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as for the Proposed Action, as described in Section 3.2.3.3.2. Therefore, they are not repeated here.

- **Impact 3.2.3.6-3:** The ground water drawdown is predicted to exceed ten feet at the locations of seven wells with associated **with active** ground water **use with water** rights.

  Significance of the Impact: Impacts to the seven wells with associated **active** ground water **use with water** rights listed in Table 3.2-10 are potentially significant until such time as the ground water level recovers to less than ten feet of drawdown, which is predicted to be less than 100 years post-Project in all cases. The impacts would become less than significant after implementation of the mitigation measures described below. Potential adverse effects to ground water rights would be mitigated **under** NDWR jurisdiction. **Therefore, no mitigation measures are proposed by the BLM for ground water rights. Section 3.26 includes suggested mitigation outside the BLM's jurisdiction for water rights.**

- **Mitigation Measure 3.2.3.6-3a:** For the seven wells with associated **active** ground water **use with water** rights EML would assess the distance of the screened interval and the pumping below the ground water table. If that difference is greater than maximum predicted drawdown, then EML would pay the water right holder for the increase in pumping costs based on historical usage. If the difference is greater than ten feet, then EML would pay for either the lowering of the pump to a depth greater than the maximum drawdown in the well, or the completion of a new well with the a screened depth greater than the maximum predicted drawdown and pay the water right holder for the increase in pumping costs based on historic usage. In addition, EML would implement the water monitoring provisions outlined in Section 2.1.15 and Appendix **C**. If, through implementation, of the water monitoring it is determined that there are impacts to wells with associated **active** ground water **use with water** rights attributable to the Project, whether predicted or not, then the following mitigation measures would be implemented. The combined surface water and ground water monitoring results would be used to trigger the implementation of Mitigation Measure 3.2.3.6-3b.

- **Mitigation Measure 3.2.3.6-3b:** If monitoring (Mitigation Measure 3.2.3.6-3a) indicates that mine-induced drawdown impacts a well with associated **active ground water use with** water rights, the following measures would be implemented:

1. The BLM would evaluate the available information and **if the drawdown can be attributed to impacts from the Project, the mitigation described above would be required**.

2. If mitigation is required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted ground water. The mitigation plan would be submitted to the BLM identifying drawdown impacts to ground water resources. Mitigation would depend on the actual impacts and site-specific conditions and could include:

   - Lowering the pump in an existing well;
   - Deepening an existing well;
   - Drilling a new well for replacement of water supply;
   - Providing a replacement water supply of equivalent yield and general water quality;
   - Pay for any incremental increase in pumping costs;
   - Modifying the KVCWF pumping regime (well locations or rates) during operations to reduce draw down in the area of the impacted ground water resources;
   - Infiltrating or injecting water during operations at strategic locations to limit drawdown propagation in certain areas.

3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures.

- **Mitigation Measure 3.2.3.6-3c:** For any significant impacts to wells with associated **active** ground water **use with water** rights that do not occur until after the end of mining and milling operations, the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the final year of the Project using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. Wells **with** associated active ground water **use with water** rights that are not owned or controlled by EML that are indicated to be significantly impacted would then be mitigated by **EML using** one or more of the following measures, as directed by the NDWR, the BLM, or the appropriate regulatory agency:

  1. Installation of a deeper well and pump at affected locations to restore the historical yield of the well (including incremental increase in pumping costs).

  2. Posting of a funding mechanism to provide for potential future impacts to potentially affected water **sources**.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.2.3.6-3b and the use of any of the options outlined above would be effective at mitigating the impacts to **wells with associated active** ground water **use with water** rights. Mitigation would be designed to address the specific ground water source that is affected, which enhances the effectiveness of the mitigation. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by providing financial compensation or ensuring that the water is made available, and because the measures **would** be reviewed and assessed by the BLM. If initial implementation were unsuccessful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. Any residual effects to ground water **uses** would be fully mitigated and over a long period of time (tens to **hundreds** of years) the drawdown effects would fully diminish, except in the vicinity of the open pit where the effects would be in perpetuity.

Impacts to Basin Water Budgets

Potential impacts to the water budgets of the basins in the HSA resulting from mine-related ground water drawdown under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as for the Proposed Action, as described in Section 3.2.3.3.2. Therefore, they are not repeated here.

- **Impact 3.2.3.6-4:** Ground water flow modeling indicates that there could be up to an approximately 25 percent decrease in **ET** of ground water in Kobeh Valley due to **a change in** phreatophyte **composition and percent cover resulting from** temporary mine-induced drawdown, which would partially offset the mine-related consumptive use of water from the Kobeh Valley basin during mining and milling operations.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.2.3.6-5:** Ground water flow modeling indicates that there could be a time-varying net change (decrease or increase) in the available ground water in Diamond Valley that is due solely to effects of the Off-Site Transfer of Ore Concentrate for Processing Alternative by the end of mining and milling operations and for at least 50 years post-Project; however, the magnitude of the predicted changes are less than 0.1 percent compared to the overall ground water budget for Diamond Valley.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Consumptive Losses

Potential impacts to water resources in the HSA resulting from long-term consumptive use of ground water under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as for the Proposed Action, as described in Section 3.2.3.3.2. Therefore, they are not repeated here.

- **Impact 3.2.3.6-6:** Consumptive use of water during mining and milling operations would support a beneficial use and would not be expected to adversely impact water resources, and EML would have adequate water rights to cover the consumptive use. Long-term consumptive use of ground water by evaporation from the pit lake surface is predicted to be approximately 100 gpm (161 afy) and would continue in perpetuity. This consumptive loss would only occur under the Off-Site Transfer of Ore Concentrate for Processing Alternative (and the Proposed Action and the Slower, Longer Project Alternative), and so represents a negative impact compared to the No Action Alternative. The 161 afy is less than 0.1 percent of the combined water budget for the Kobeh and Diamond Valleys.

  Significance of the Impact: Impacts during mining and milling operations are less than significant. After those operations cease, direct impacts of pit lake evaporation do not result in significant impacts.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Potential Impacts Due to Subsidence

Potential for Changes to Aquifer Productivity

Potential impacts to aquifer productivity resulting from dewatering-induced land subsidence under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as for the Proposed Action, as described in Section 3.2.3.3.2. Therefore, they are not repeated here.

- **Impact 3.2.3.6-7:** A small change in aquifer characteristics is expected to result from compaction of the aquifer materials. Ground subsidence of greater than one-half-foot is projected to extend approximately four miles quasi-radially from the center of subsidence effects in the northern part of the KVCWF area, and a maximum subsidence of approximately 2.5 feet is projected in a small part of that central area. The subsidence would result primarily from a permanent reduction in porosity of the finer grained sediments (clays and silty clays), which are not the primary water-bearing materials in the basin-fill aquifer.

  Significance of the Impact: The potential for the Kobeh Valley basin-fill aquifer to transmit or store water is not expected to be significantly impacted.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Potential for Significant Land Surface Alteration

Potential impacts to ground surface conditions (fissuring or alteration of drainage patterns) resulting from dewatering-induced land subsidence under the Off-Site Transfer of Ore Concentrate for Processing Alternative would be the same as for the Proposed Action, as described in Section 3.2.3.3.2. Therefore, they are not repeated here.

- **Impact 3.2.3.6-8:** Differential subsidence could result in the development of fissures, creating a potential to degrade waters of the state. Fissures could provide a preferential flow path for uncontained process fluids or chemical or hydrocarbon releases. Capture of surface runoff by fissures may form erosional fissure gullies, which represent a safety risk to wildlife, livestock, wild horses, and people.

  Significance of the Impact: The impact would be significant if fissure gullies formed.

- **Mitigation Measure 3.2.3.6-8:** EML would be responsible for specifically monitoring for fissure gully development. If fissure gullies form, they would be filled in with clean, coarse-grained alluvium, with the intent of providing a rapid means of dissipation for any surface water entering the fissure, thereby reducing the propagation of the fissure through continued erosion. The fill material then would be seeded with a BLM-approved seed mix.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.2.3.6-8 would be effective at mitigating the fissures that develop. Any residual effects of fissure development would be fully mitigated during the life of the Project.

3.2.3.7 Slower, Longer Project Alternative

The Slower, Longer Project Alternative (described in Section 2.2.3) would have similar potential water quantity impacts as the Proposed Action (Section 3.2.3.3); however, these impacts would occur over different time frames due to the decreased ground water production on an annual basis, but over a longer time period. There would be no reduction in the pit dewatering rates compared to the Proposed Action due to dewatering through in pit drain sump. The process-water supply requirements would be the same over the life of the alternative, but less than the Proposed Action on a daily basis. The pit lake evaporation rates under the Slower, Longer Project Alternative, relative to the Proposed Action would be the same.

3.2.3.7.1 Surface Water Resources

Erosion, Sedimentation, and Flooding within Drainages

Even with the implementation of the Project BMPs, the potential impacts to surface drainages involving erosion, sedimentation, or alteration of flood runoff patterns under the Slower, Longer Project Alternative would occur and would be similar to those for the Proposed Action, although shifted in time, as described in Section 3.2.3.3.1. Therefore, they are not repeated here.

- **Impact 3.2.3.7-1:** Grading, earth moving, diversion of drainages, and placement of fill could accelerate erosion and sedimentation and alter surface-water flood runoff patterns during mining and post-closure.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Effects of Ground Water Drawdown on Streams, Springs, and Surface Water Resources

Potential impacts to the flow of streams and springs in the HSA resulting from mine-related ground water drawdown under the Slower, Longer Project Alternative would be similar in extent to those of the Proposed Action, as described in Section 3.2.3.3.1, but shifted in time due to the timing of activities under this alternative.

Figure 3.2.2**9** shows graphically the results of the numerical ground water flow model expressed as water table drawdown contours at the end of the mining and milling operations under the Project. This figure illustrates, for comparison, areas of predicted ground water drawdown relative to the existing baseline ground water elevations at the end of 2009, for both the Slower, Longer Project Alternative, as well as the Proposed Action. By the end of the mining and milling operations (in 2099), two distinct drawdown areas are predicted to develop: one area centered on the open pit and the other area surrounding the KVCWF wells. These ground water modeling results indicate that the ground water would be drawn down by more than ten feet at 24 spring locations (six more locations than under the Proposed Action) and at one perennial stream segment (Roberts Creek) at the end of the mining and milling operations. By the end of the predictive simulations **for** the **maximum extent of drawdown under the** Slower, Longer Project Alternative results indicate that the ground water would be drawn down by more than ten feet at **29** spring locations (eight more locations than under the Proposed Action). Table 3.2-8 indentifies the springs affected under the Proposed Action and Table 3.2-17 identifies those additional springs that may be affected under the Slower, Longer Project Alternative. The ground water level is not expected to be drawn down by more than ten feet at any other spring or perennial stream segment at the end of mining/milling operations. Nine of the potentially affected springs (Tables 3.2-8 and 3.2-17) and the perennial stream segment appear to be associated with water rights. In addition, springs that have not been identified as having PWRs, but with sufficient flows to support a PWR could be affected. **Impacts to surface water resources could occur in areas with less than ten feet of predicted drawdown.**

Table 3.2-17: Springs that May be Affected by Slower, Longer Project Alternative Which are in Addition to Those Under the Proposed Action

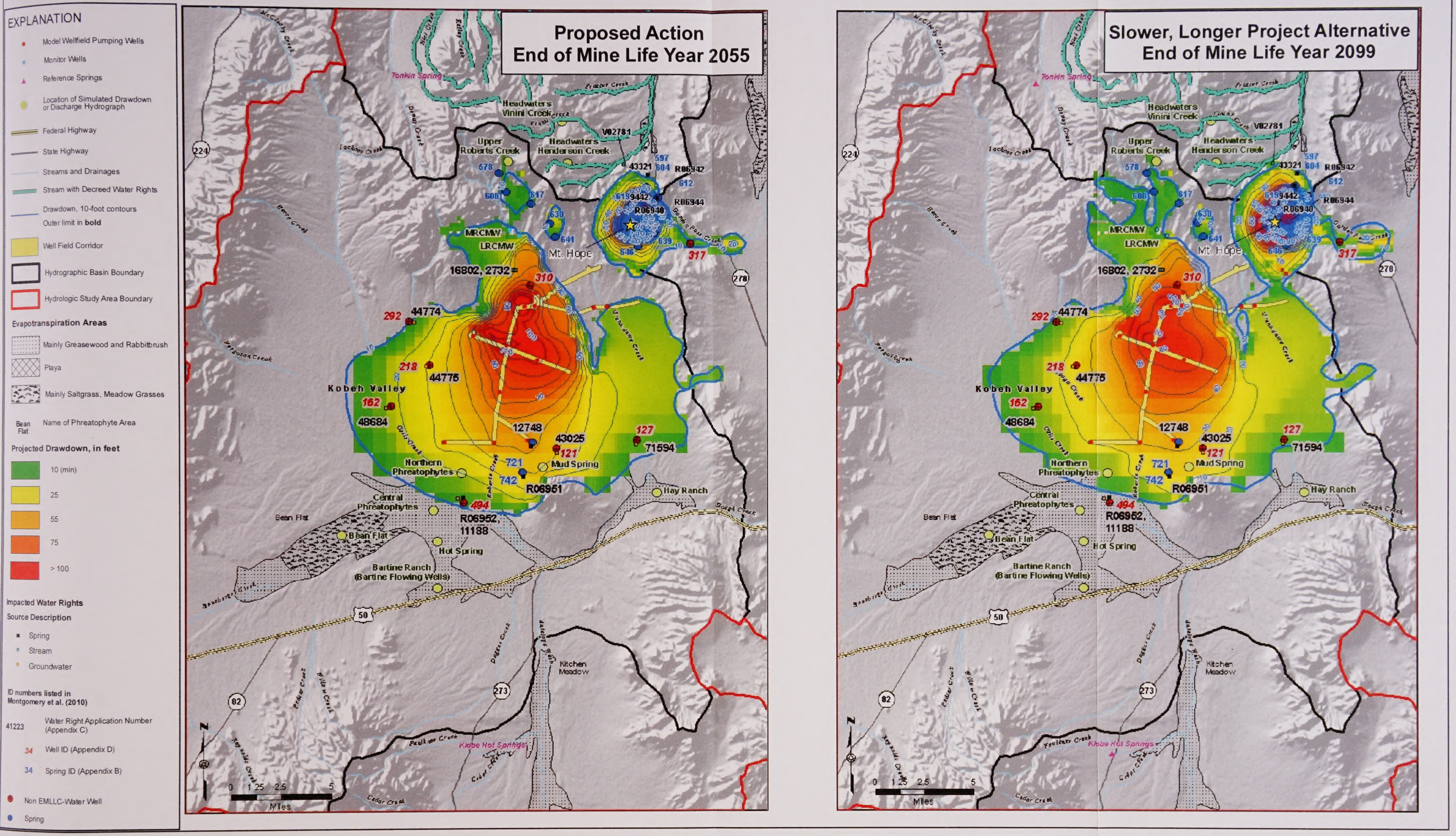
Spring Number	Spring Name	Basin	Flow (gpm)	Use
545	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses
558	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses
561	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses
568	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses
575	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses
584	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses
635	Unnamed Spring	Kobeh Valley	--	Livestock, Wildlife, and Wild Horses

After dewatering ceases (Year 64), the ground water would begin to recover in the open pit area. Similarly, ground water in the basin-fill and bedrock aquifers of Kobeh Valley would begin to recover when pumping in the KVCWF ceases (Year 88). The limits of ground water drawdown surrounding the open pit and KVCWF would continue to expand after open pit dewatering and production well pumping cease, as the open pit and dewatered portions of the aquifers fill with ground water that is derived from storage as well as natural recharge. Due to aquifer geometry and heterogeneity, the rate and ultimate extent of continued lateral expansion of drawdown would not be the same in all directions. Figure 3.2.**30** shows the simulated ten-foot water table drawdown contours at 12 time intervals, between ten and 400 years post-Project recovery, and illustrates the composite maximum-extent-of-drawdown used in this analysis. The boundary of the maximum-extent-of-drawdown encompasses all of the areas that are predicted to experience more than ten feet of drawdown at any time in the future due to the Slower, Longer Project Alternative. In the vicinity of Mount Hope, the maximum extent of the ten-foot drawdown contour is approximately one mile beyond its location at the end of the mining and milling operations, whereas for the area surrounding the KVCWF, the difference generally is much less (on the order of 0.1 mile) beyond the ten-foot drawdown contour at the end of active pumping. **Impacts to surface water resources could occur in areas with less than ten feet of predicted drawdown.**

The maximum extent of the ten-foot drawdown contour encompasses 29 springs, two perennial stream segments (Roberts Creek and South Fork of Henderson Creek), and portions of four intermittent and ephemeral stream drainages (Coils Creek, Rutabaga Creek, U'ans-in-dame Creek, and Garden Pass Creek), as shown in Figure 3.2.3**1**. As discussed in Section 3.2.2.3.1, the stream reaches and springs located in this area can be characterized as either intermittent, ephemeral, or perennial. Intermittent and ephemeral stream reaches and spring sites flow only during or after wet periods in response to rainfall or snowmelt runoff events. By definition, these surface waters are not controlled by discharge from the regional ground water system. During the low flow period of the year (late summer through fall), intermittent and ephemeral stream reaches and springs typically would be dry. In contrast, perennial stream segments and springs generally flow throughout the year. Flows observed during the wet periods, which typically extend from spring through early summer, include a combination of surface runoff and ground water discharge, whereas flows observed during the low-flow period are sustained entirely by discharge from the ground water system. If the flow in these stream segments and springs relies on the aquifer that is being dewatered, a reduction of ground water levels from mine-induced drawdown could reduce the ground water discharge to perennial stream segments or springs.

Of the 29 potentially impacted springs, nine appear to be associated with water rights (Table 3.2-6) and at least eight are considered perennial (Table 3.2-8), which is the same as under the Proposed Action. The identified potentially-impacted perennial springs are all located at high elevations in the Roberts Mountains and on the flanks of Mount Hope, and within approximately four miles of the proposed open pit. The source of these springs is believed to be the fractured bedrock aquifer, which receives recharge from the higher elevations as infiltration of snowmelt and rainfall.

Surface water flow in Roberts Creek, located approximately 6.5 miles west of the proposed open pit, is fed by springs that flow into Roberts Creek or its tributaries. The upper spring-fed segments of Roberts Creek generally flow throughout the year, **and as with other springs in the upper elevations of Roberts Mountain** the springs within the drawdown area that feed those segments are believed to originate in areas of localized, perched ground water that are not hydraulically interconnected with the regional ground water system. **It is also possible that geologic block faulting has compartmentalized the ground water flow at some of these spring sites so that they would be isolated from mine-induced drawdown, but there is no available evidence to define such conditions if they exist. For the purposes of this analysis,**


EXPLANATION
Model Wellfield Pumping Wells
Monitor Wells
Reference Springs
Location of Simulated Drawdown or Discharge Hydrograph
Federal Highway
State Highway
Streams and Drainages
Stream with Decreed Water Rights
Drawdown, 10-foot contours Outer limit in bold
Well Field Corridor
Hydrographic Basin Boundary
Hydrologic Study Area Boundary
Evapotranspiration Areas
Mainly Greasewood and Rabbitbrush
Playa
Mainly Saltgrass, Meadow Grasses
Bean Flat
Name of Phreatophyte Area
Projected Drawdown, in feet
10 (min)
25
55
75
> 100
Impacted Water Rights
Source Description
Spring
Stream
Groundwater
ID numbers listed in Montgomery et al. (2010)
41223
Water Right Application Number (Appendix C)
34
Well ID (Appendix D)
34
Spring ID (Appendix B)
Non EMLLC-Water Well
Spring
Proposed Action
End of Mine Life Year 2055
Slower, Longer Project Alternative
End of Mine Life Year 2099
Tonkin Spring
Headwaters Vinini Creek
Upper Roberts Creek
Headwaters Henderson Creek
V02781
43321
R06942
R06944
R06940
9442
Mt. Hope
MRCMW
LRCMW
16802, 2732
310
317
292
44774
218
44775
162
48684
Kobeh Valley
12748
43025
121
127
71594
Northern Phreatophytes
Mud Spring
721
742
R06951
Hay Ranch
Central Phreatophytes
494
R06952, 11188
Bean Flat
Hot Spring
Bartine Ranch (Bartine Flowing Wells)
Kitchen Meadow
Klobe Hot Springs
578
608
617
630
641
646
639
597
604
612
619
224
278
50
82
273
0 1.25 2.5 5
Miles
N

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0 1.25 2.5 5 Miles

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FILE NAME: p1635_Fig3-2-29_ExtendedAlt_ProposedAction_DD_SideBySide.mxd

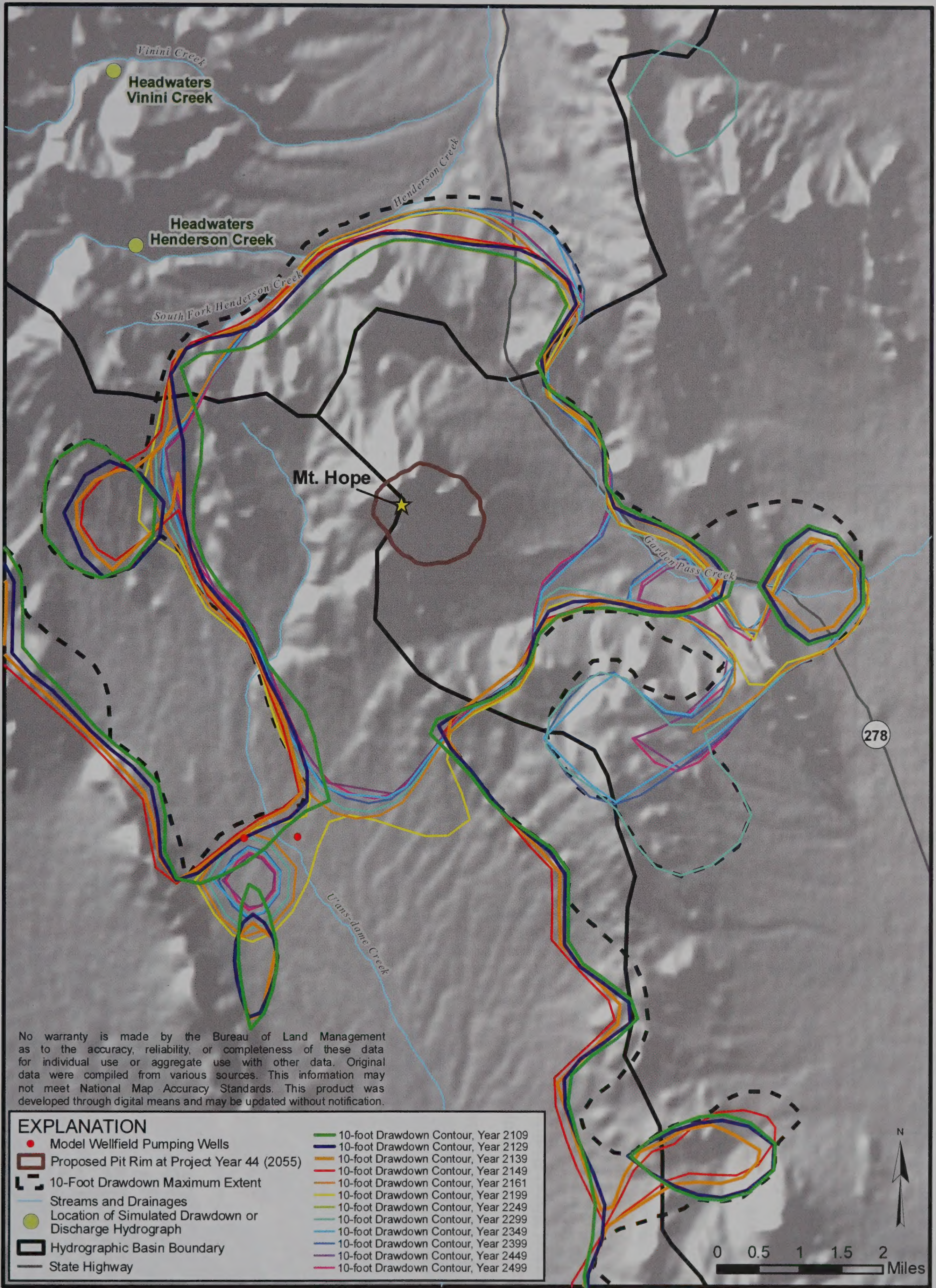
BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Projected Drawdown of Water Table for
Proposed Action Mine Year 44 (2055)
and Slower, Longer Project Alternative
Mine Year 88 (2099)

Figure 3.2.29


Vinini Creek
Headwaters Vinini Creek
Henderson Creek
Headwaters Henderson Creek
South Fork Henderson Creek
Mt. Hope
Garden Pass Creek
278
U'ans-dame Creek
EXPLANATION
● Model Wellfield Pumping Wells
Proposed Pit Rim at Project Year 44 (2055)
10-Foot Drawdown Maximum Extent
Streams and Drainages
Location of Simulated Drawdown or Discharge Hydrograph
Hydrographic Basin Boundary
State Highway
10-foot Drawdown Contour, Year 2109
10-foot Drawdown Contour, Year 2129
10-foot Drawdown Contour, Year 2139
10-foot Drawdown Contour, Year 2149
10-foot Drawdown Contour, Year 2161
10-foot Drawdown Contour, Year 2199
10-foot Drawdown Contour, Year 2249
10-foot Drawdown Contour, Year 2299
10-foot Drawdown Contour, Year 2349
10-foot Drawdown Contour, Year 2399
10-foot Drawdown Contour, Year 2449
10-foot Drawdown Contour, Year 2499
N
0 0.5 1 1.5 2 Miles

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FILE NAME: p1635_Fig3-2-30_ExtendedAlt_DDPostYears.mxd

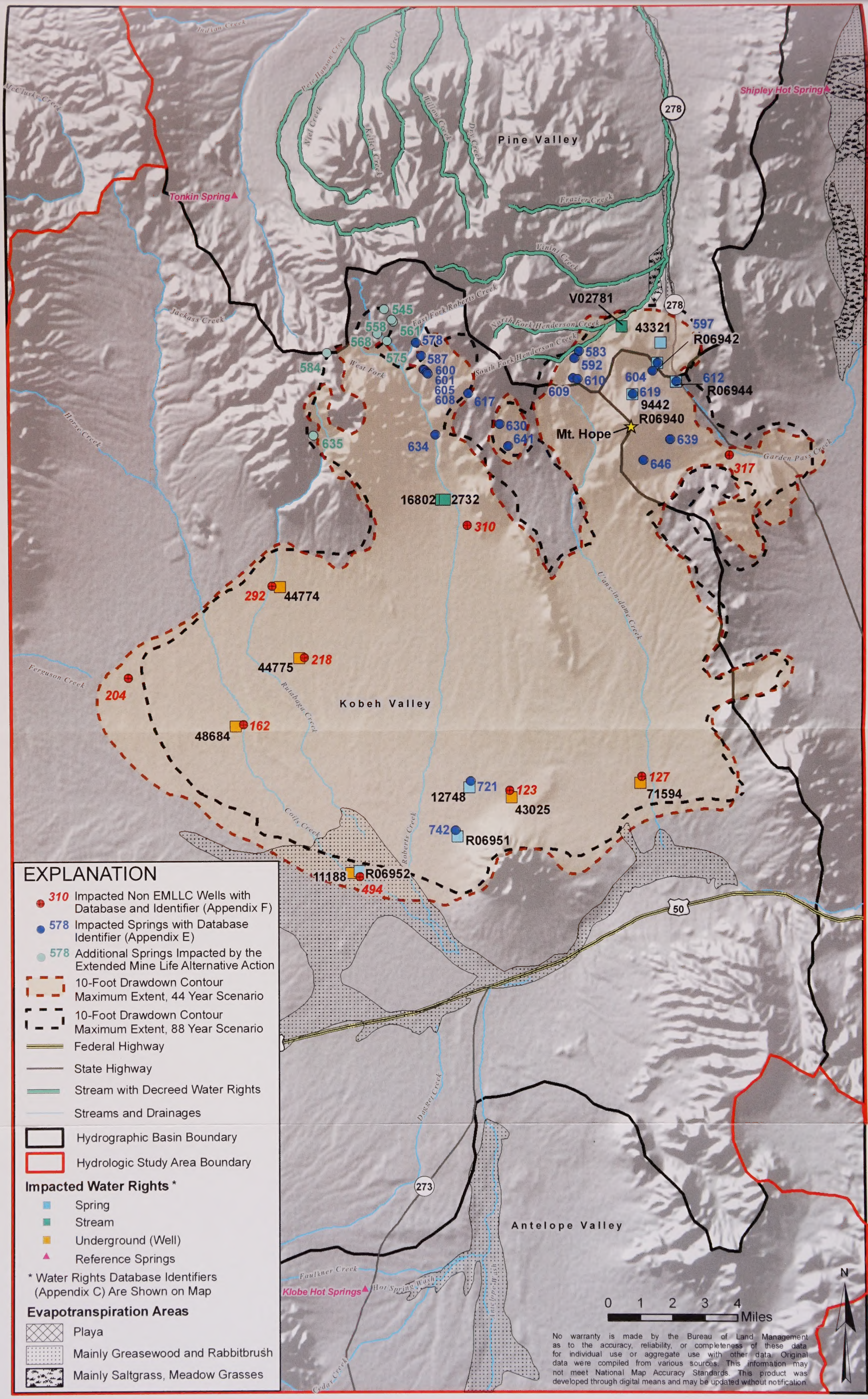
BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Slower, Longer Project Alternative - Simulated Ten-Foot Water Table Drawdown Contours During 400 Years of Post-Mining Recovery

Figure 3.2.30


Indian Creek
McClusky Creek
Pete Hanson Creek
Birch Creek
Nigel Creek
Willow Creek
Kelly Creek
Dry Creek
Pine Valley
278
Shipley Hot Spring
Frazier Creek
Tonkin Spring
Vinini Creek
Jackass Creek
East Fork Roberts Creek
North Fork Henderson Creek
South Fork Henderson Creek
West Fork
V02781
43321
597
R06942
545
558
561
568
578
575
584
587
600
601
605
608
583
592
610
609
604
619
612
R06944
9442
R06940
617
630
641
634
635
Mt. Hope
639
646
317
Garden Pass Creek
Horse Creek
16802
2732
310
Henderson Creek
292
44774
218
44775
Ferguson Creek
204
Rutabaga Creek
Kobeh Valley
162
48684
721
12748
123
43025
127
71594
742
R06951
Coils Creek
Roberts Creek
11188
R06952
494
50
Dagget Creek
273
Antelope Valley
Faulkner Creek
Klobe Hot Springs
Hot Spring Wash
Antelope Wash
Cedar Creek
0
1
2
3
4
Miles
N
EXPLANATION
310 Impacted Non EMLLC Wells with Database and Identifier (Appendix F)
578 Impacted Springs with Database Identifier (Appendix E)
578 Additional Springs Impacted by the Extended Mine Life Alternative Action
10-Foot Drawdown Contour Maximum Extent, 44 Year Scenario
10-Foot Drawdown Contour Maximum Extent, 88 Year Scenario
Federal Highway
State Highway
Stream with Decreed Water Rights
Streams and Drainages
Hydrographic Basin Boundary
Hydrologic Study Area Boundary
Impacted Water Rights *
Spring
Stream
Underground (Well)
Reference Springs
* Water Rights Database Identifiers (Appendix C) Are Shown on Map
Evapotranspiration Areas
Playa
Mainly Greasewood and Rabbitbrush
Mainly Saltgrass, Meadow Grasses

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BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Comparison of Proposed Action and Slower, Longer Project Alternative with Respect to Springs, Non-EML Wells and Water Rights within the Composite Maximum Extent of the Ten-Foot Drawdown Contour

Figure 3.2.31

it was conservatively assumed that all of the springs located in this area projected to experience ten feet or more of drawdown are interconnected with the regional ground water system and potentially could be impacted due to water-table lowering attributable to the Slower, Longer Project Alternative.

Surface flow in Roberts Creek diminishes below the confluence of its upper three forks, where the creek enters a small limestone canyon for approximately one mile and then opens into a broad alluvial channel after the stream exits the mountain valley. It is assumed that stream flow in that reach could potentially be impacted due to water-table lowering attributable to the Slower, Longer Project Alternative because the simulated ground water drawdown is greater than ten feet beneath a perennial segment of Roberts Creek.

Surface water flow in the South Fork of Henderson Creek, located approximately three miles northwest of the proposed open pit, is perennial and is believed to be sustained by both perennial and non-perennial springs in headwater drainages that feed into the creek. Year-round flow occurs along at least a two-mile segment of the South Fork of Henderson Creek and ceases near its confluence with the North Fork of Henderson Creek, where all of the surface water flow is lost to infiltration and **ET**. It is assumed that stream flow in that reach potentially could be impacted due to water-table lowering attributable to the Slower, Longer Project Alternative because the simulated ground water drawdown is greater than ten feet beneath a perennial segment of the South Fork of Henderson Creek. The other streams in the HSA are either located outside of the maximum-extent-of-drawdown induced by the Slower, Longer Project Alternative, or are intermittent or ephemeral streams that would not be expected to be significantly impacted by mine-related dewatering and KVCWF pumping.

The actual impacts to individual stream reaches or springs would depend on the source of ground water that sustains the perennial flow (perched or hydraulically isolated aquifer versus regional ground water system) and the actual extent of mine-induced drawdown that occurs in the area. The interconnection (or lack thereof) between perennial surface water features and deeper ground water sources is controlled in large part by the specific hydrogeologic conditions that occur at each site. Considering the complexity of the hydrogeologic conditions in the region and the inherent uncertainty in numerical modeling predictions relative to the exact areal extent of a predicted drawdown area, it is not possible to conclusively identify specific stream segments or springs that would or would not be impacted by future mine-induced ground water drawdown; **however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity**.

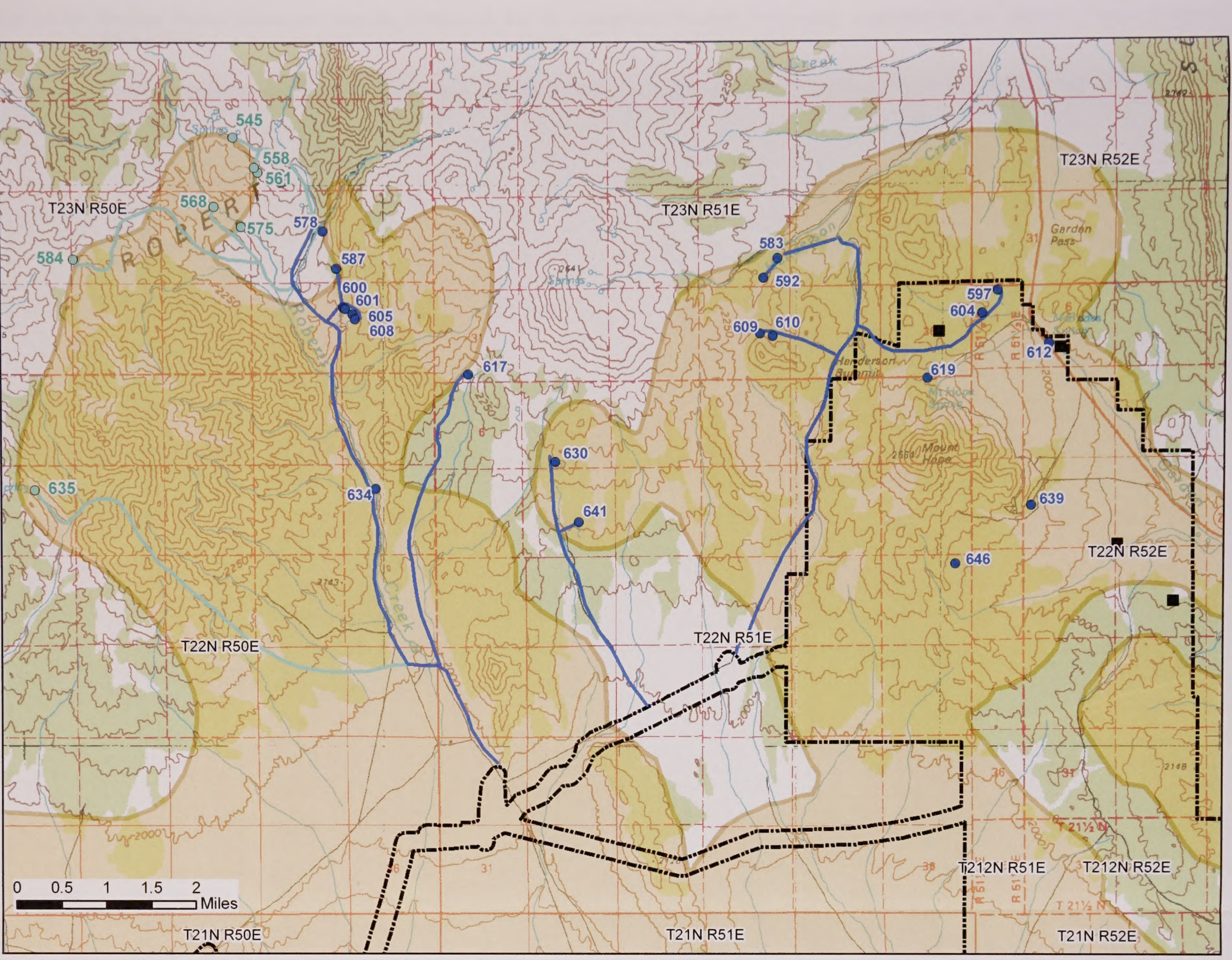
If the Project under this alternative is approved, EML would be required to monitor surface and ground water to assess the extent of drawdown from open pit dewatering and ground water production over time and the potential effects to surface waters.

- **Impact 3.2.3.7-2:** The ground water drawdown is predicted to be more than ten feet for two perennial stream segments (Roberts Creek and South Fork of Henderson Creek) and at 29 perennial or potentially perennial spring sites (Tables 3.2-8 and 3.2-17) for varying periods of time up to at least 400 years after the end of mining and milling operations. **Other individual streams and springs outside of the model predictions could also be impacted.**

Significance of the Impact: The impacts are potentially significant at the two stream segments and 29 springs mentioned above. Although significant impacts are not predicted to occur in the other individual streams or springs in the HSA, the uncertainty of predicting impacts to streams and springs indicates a need for operational monitoring and mitigation measures to be implemented. If **monitoring, which has been incorporated into the mitigation measure, indicates that there are** reduced flows in perennial stream segments or springs that the BLM determines can be attributed to the mining operation, then **specific** mitigation would be implemented, as described below. Potential adverse effects to surface water rights would be mitigated **under** NDWR jurisdiction.

- **Mitigation Measure 3.2.3.7-2a:** Specific mitigation for the two perennial stream segments and **29** perennial or potentially perennial spring sites are outlined in Tables 3.2-9 and 3.2-18. **Figure 3.2.32 shows the anticipated location for the components of the facilities necessary to implement the mitigation measures outlined in Table 3.2-9. Implementation of any of the specific mitigation outlined in Table 3.2-9 for springs located on private land would be subject to the authorization of the private land owner. The site-specific evaluation of the effectiveness of this specific mitigation for each identified surface water resource within the mine-related ground water drawdown area is presented in Table 3.2-9. The site-specific measures include one or more methods identified in Mitigation Measure (3.2.3.7-2b). Similar methods (as identified in Table 3.2-9) would also be applied to streams and springs not identified in this analysis, if monitoring indicates that there are impacts that the BLM determines can be attributed to the mining operation.** Implementation of the mitigation outlined in these tables would result in a total of up to **approximately 57.3** acres of surface disturbance associated with the pipeline construction and maintenance (i.e., up to **approximately 37.2** acres of surface disturbance associated with the mitigation for the 22 springs outlined in Section 3.2.3.3 and up to **approximately** 20.1 acres associated with the mitigation for the seven additional springs potentially impacted by this alternative)**, as well as the need for approximately 313 acre-feet of water that would at least initially come from EML's existing water rights if additional water rights have not been secured. This specific mitigation would be implemented, as determined by the BLM, based on the results of the monitoring that is also outlined in this mitigation measure.** EML would implement the water monitoring provisions outlined in Section 2.1.15 and Appendix **C** to track the drawdown associated with the open pit dewatering and water production activities. In addition, EML would update the ground water flow model, as determined by the BLM. EML would be responsible for monitoring and annual reporting of changes in ground water levels and surface water flows prior to and during operation, and for a period of up to 30 years in the post mining and milling phase. **The reports would be in a format and with a content that is acceptable to the BLM. The monitoring outlined in Appendix C and required in this mitigation measure would be used to document the effectiveness of the implemented specific mitigation activities. In addition, the BLM has the ability to require the implementation of additional mitigation measures if the initial implementation is unsuccessful.**

- **Mitigation Measure 3.2.3.7-2b:** If monitoring (Mitigation Measure 3.2.3.7-2a) indicates that flow reductions of perennial surface waters are occurring and that these reductions


545
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617
619
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641
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646
T23N R50E
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T212N R52E
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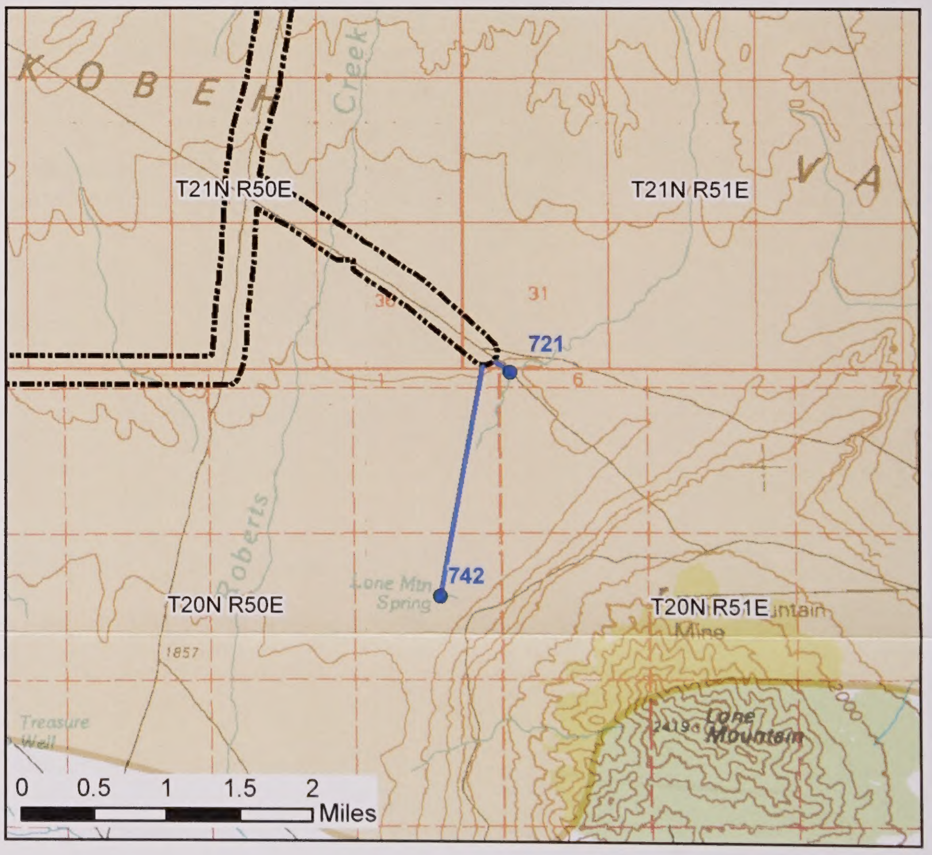
0 0.5 1 1.5 2
Miles


T21N R50E
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T20N R50E
T20N R51E
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Miles

EXPLANATION

- ⬚ Project Boundary
- ▨ 10-Foot Drawdown Maximum Extent, 88 Year Scenario
- ● Impacted Mine Only Springs
- ○ Additional Springs
- ■ Guzzler Installations
- — Proposed Action Pipelines with Existing and New Roads
- — Slower, Longer Project Alternative Pipelines with Existing and New Roads

BATTLE MOUNTAIN DISTRICT OFFICE
Mount Lewis Field Office
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Battle Mountain, Nevada 89820

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DESIGN:	EMLLC	DRAWN:	GSL	REVIEWED:	RFD
CHECKED:	-	APPROVED:	RFD	DATE:	08/08/2012

FILE NAME: p1635_Fig3-2-32_SurfaceWaterMitigationComponentsSlowerLonger.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Slower, Longer Project Alternative Surface Water Mitigation Components

Figure 3.2.32

Table 3.2-18: Surface Water Resources Specific Mitigation for the Additional Springs Potentially Impacted by the Slower, Longer Project Alternative

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics	Associated Riparian/ Wetland Vegetation (acres)[2]	Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate)
545	Unnamed Spring	*	This site is a spring that discharges to a riparian area. This site supports an established riparian vegetation community. This site shows utilization by livestock and wildlife.	0.052	Water supply for wildlife, livestock, and wild horses.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-1: Pipe water along an existing road, approximately 2.4 miles long, from the pipeline for spring 578 at a sustained rate of approximately 1.0 gpm.	The mitigation plan for SSMM-1 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 4.4 acres of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**
558	Unnamed Spring Milk Ranch Spring)	4.00	This site is a spring that discharges to a riparian area. This site supports an established riparian vegetation community. This site shows utilization by livestock and wildlife.	0.052	Water supply for wildlife and livestock use.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-2: Pipe water along a new road, approximately 0.4 miles long, from the pipeline to spring 545 at a sustained rate of approximately four gpm.	The mitigation plan for SSMM-1 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 1.0 acres of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics	Associated Riparian/ Wetland Vegetation (acres)[2]	Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate)
									loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.
561	Unnamed Spring	4.90	This site is a spring that is piped to a surface discharge. This site supports an established riparian vegetation community. This site shows utilization by livestock and wildlife.	0.104	Water supply for wildlife, livestock, and wild horses.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-3: Pipe water along a new road, approximately 0.1 miles long, from the pipeline to spring 558 at a sustained rate of approximately four gpm.	The mitigation plan for SSMM-3 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 0.2 acres of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics	Associated Riparian/ Wetland Vegetation (acres)[2]	Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate)
568	Unnamed Spring	*	This site is a seep with saturated soil, but not contributing flow into the drainage. This site supports a riparian vegetation community. This site shows moderate livestock use for water.	0.052	Water supply for wildlife and wild horses with limited livestock use.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-4: Pipe water along an existing road, approximately 0.1 miles long, from the pipeline to spring 575 at a sustained rate of approximately 1.0 gpm.	The mitigation plan for SSMM-4 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 0.1 acres of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**
575	Unnamed Spring	0.24	This site is a spring that discharges to a riparian area. This site supports an established riparian vegetation community. This site shows utilization by livestock and wildlife.	0.104	Water supply for wildlife, livestock, and wild horses.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-5: Pipe water along an existing road, approximately 1.4 miles long, from the pipeline to spring 584 at a sustained rate of approximately 0.2 gpm.	The mitigation plan for SSMM-5 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 1.7 acres of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat,**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics	Associated Riparian/ Wetland Vegetation (acres)[2]	Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate)
									air quality impacts, and potential impacts to cultural resources.
584	Unnamed Spring	0.42	This site is a spring that discharges to a riparian area. This site supports an established riparian vegetation community. This site shows utilization by livestock and wildlife.	0.052	Water supply for wildlife, livestock, and wild horses.	**Reduction** of flow coincident with a reduction in ground water levels in this area, as determined from ground water monitoring.	SSMM-6: Pipe water along an existing road, approximately 3.1 mile long, from the pipeline to spring 578 at a sustained rate of approximately 0.4 gpm.	The mitigation plan for SSMM-6 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 3.8 acres of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**

Spring Number	Spring Name	Flow (gpm)[1]	Site Characteristics	Associated Riparian/ Wetland Vegetation (acres)[2]	Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-Specific Mitigation Plan	New Disturbance From Mitigation Implementation[3] (acres-approximate)
635	Unnamed Spring	0.77	This site consists of a man-made pond. The site has little riparian vegetation around the edge of the pond. This site show heavy use by wildlife and wild horses for water.	0.104	Water supply and riparian habitat for wildlife, livestock, and wild horses.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in ground water levels in this area, as determined from ground water monitoring	SSMM-7: Pipe water along an existing road, approximately 7.3 mile long, from the Project water supply system at a sustained rate of approximately 0.7 gpm.	The mitigation plan for SSMM-7 would be highly effective at maintaining habitat diversity and would provide a perennial water supply for livestock, wildlife, and wild horse uses.	Up to approximately 8.9 acre of new surface disturbance for the installation and maintenance of the water pipeline. **This surface disturbance would result in a loss of vegetation and associated wildlife habitat, air quality impacts, and potential impacts to cultural resources.**

[1] All flow data in this table from SRK 2007e, except springs identified with an *, which indicates that no flow data were available.

[2] All acreage data in this table are estimated from SRK 2007e or Google Earth™.

[3] Disturbance areas would be managed and reclaimed in accordance with BLM and State of Nevada requirements.

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are likely the result of mine-induced drawdown, the following measures would be implemented:

1. The BLM would evaluate the available information and determine whether mitigation is required.

2. If mitigation would be required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted perennial water resource(s). Potential adverse effects to water rights would be mitigated **under** NDWR jurisdiction**, as well as potential need for additional BLM permit acquisition activities and NEPA analysis**. The mitigation plan would be submitted to the BLM identifying the excess in drawdown or drawdown impacts to surface water resources. Mitigation would depend on the actual impacts, site-specific conditions, and historical use and could include a variety of measures (e.g., flow augmentation, on-site or off-site improvements). Methods to enhance or replace the impacted perennial water resources include, but are not limited to, the following:

   - Modification**, including cessation,** of pumping distribution in the water supply well field;
   - Injection to confine the drawdown cone;
   - Installation of a water-supply pump in an existing well (e.g., monitoring well);
   - Installation of a new water production well;
   - Piping from a new or existing source;
   - Installation of a guzzler;
   - Enhanced development of an existing seep or spring to promote additional flow;
   - **Water hauling;**
   - **Removal of Piñon-Juniper in impacted watersheds;** or
   - Fencing or other protective measures for an existing seep to maintain flow.

3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures.

- **Mitigation Measure 3.2.3.7-2c:** The numerical ground water flow modeling indicates that some impacts to springs may occur after the end of mining and milling operations, when some of the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the closure process consistent with regulations and policies using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. If the BLM determines that the Project would impact perennial stream segments or spring sites in this post-operational phase, mitigation consisting of one or both of the following measures would be required:

1. Installation of a well and pump at affected stream or spring locations to restore the historic yield of the affected surface water resource.

2. Posting of an additional financial guarantee to provide for potentially affected water supplies in the future.

- **Effectiveness of Mitigation and Residual Effects:** Mitigation would be designed to address the specific spring or surface water that is affected, which enhances the effectiveness of the mitigation. In addition, a variety of approaches to mitigation can be used within these measures to achieve the objective. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by restoring or enhancing surface flows, and because the measures would be reviewed and addressed by the BLM. The effectiveness of Mitigation Measure 3.2.3.7-2c, if implemented, is less certain since it would occur many decades in the future. If initial implementation was not successful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. However, **this type of mitigation has been proven to be effective and** if measures used in Mitigation Measure 3.2.3.7-2b are implemented, then the measure should be effective at mitigating the impacts from reduced surface water flows. Over a long period of time (tens to **hundreds** of years) the effects to most surface water flows would diminish; however, for the springs nearest to the open pit, flows would be reduced or eliminated in perpetuity.

3.2.3.7.2 Ground Water Resources

Lowering of the Water Table

Impacts to Ground Water Resources

Potential impacts to the water resources and thus the associated ground water users within the HSA resulting from mine-related ground water drawdown under the Slower, Longer Project Alternative would be similar as for the Proposed Action, as described in Section 3.2.3.3.2. Therefore, they are not repeated here.

- **Impact 3.2.3.7-3:** The ground water drawdown is predicted to exceed ten feet at the locations of seven wells with associated **active** ground water **use with water** rights, which is similar to those under the Proposed Action.

  Significance of the Impact: Impacts to the seven wells with associated **active** ground water **use with water** rights listed in Table 3.2-10 are potentially significant until such time as the ground water level recovers to less than ten feet of drawdown, which is predicted to be less than 100 years post-Project in all cases. The impacts would become less than significant after implementation of the mitigation measures described below. Potential adverse effects to ground water rights would be mitigated **under** NDWR jurisdiction. **Therefore, no mitigation measures are proposed by the BLM for ground water rights. Section 3.26 includes suggested mitigation outside the BLM's jurisdiction for water rights.**

- **Mitigation Measure 3.2.3.7-3a:** For the seven wells with associated **active** ground water **use with water** rights EML would assess the distance of the screened interval and the pumping below the ground water table. If that difference is greater than maximum predicted drawdown, then EML would pay the water right holder for the increase in pumping costs based on historical usage. If the difference is greater than ten feet, then EML would pay for either the lowering of the pump to a depth greater than the maximum drawdown in the well, or the completion of a new well with the a screened depth greater than the maximum predicted drawdown and pay the water right holder for the increase in pumping costs based on historic usage. In addition, EML would implement the water monitoring provisions outlined in Section 2.1.15 and Appendix **C**. If, through implementation of the water monitoring it is determined that there are impacts to wells with associated **active** ground water **use with water** rights attributable to the Project, whether predicted or not, then the following mitigation measures would be implemented. The combined surface water and ground water monitoring results would be used to trigger the implementation of Mitigation Measure 3.2.3.7-3b.

- **Mitigation Measure 3.2.3.7-3b:** If monitoring (Mitigation Measure 3.2.3.7-3a) indicates that mine-induced drawdown impacts **a well** with associated **active ground** water **use with water** rights, the following measures would be implemented:

  1. The BLM would evaluate the available information and **if the drawdown can be attributed to impacts from the Project, the mitigation described above would be required**.

  2. If mitigation is required by the BLM, then EML would be responsible for preparing a detailed, site-specific plan to enhance or replace the impacted ground water. The mitigation plan would be submitted to the BLM identifying drawdown impacts to ground water resources. Mitigation would depend on the actual impacts and site-specific conditions and could include the following:

     - Lowering the pump in an existing well;
     - Deepening an existing well;
     - Drilling a new well for replacement of water supply;
     - Providing a replacement water supply of equivalent yield and general water quality;
     - Pay for an incremental increase in pumping costs;
     - Modifying the KVCWF pumping regime (well locations or rates) during operations to reduce drawdown in the area of the impacted ground water resources;
     - Infiltrating or injecting water during operations at strategic locations to limit drawdown propagation in certain areas.

  3. An approved site-specific mitigation plan would be implemented followed by monitoring and reporting to measure the effectiveness of the implemented measures.

- **Mitigation Measure 3.2.3.7-3c:** For any significant impacts to wells with associated **active** ground water **use with water** rights that do not occur until after the end of mining and milling operations, the operational measures described above may not be available. For the post-Project delayed impacts of drawdown, the ground water flow model would be updated during the final year of the Project using the accumulated field data for pumping rates, consumptive use, and observed drawdown within the HSA to re-evaluate projected drawdown that would occur after the end of mining and milling operations. Wells **with** associated active ground water **use with water** rights that are not owned or controlled by EML that are indicated to be significantly impacted would then be mitigated by **EML using** one or more of the following measures, as directed by the NDWR, the BLM, or the appropriate regulatory agency:

1. Installation of a deeper well and pump at affected locations to restore the historical yield of the well (including incremental increase in pumping costs).
2. Posting of a funding mechanism to provide for potential future impacts to potentially affected water **sources**.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.2.3.7-3b and the use of any of the options outlined above would be effective at mitigating the impacts to **wells with associated active** ground water **use with water** rights. Mitigation would be designed to address the specific ground water source that is affected, which enhances the effectiveness of the mitigation. These mitigation measures are expected to be effective because the mitigation measures are specifically intended to directly address the impact by providing financial compensation or ensuring that the water is made available, and because the measures **would** be reviewed and assessed by the BLM. If initial implementation was not successful, the BLM may require implementation of additional measures. The feasibility and success of mitigation would depend on site-specific conditions and details of the mitigation plan. Any residual effects to ground water rights would be mitigated and over a long period of time (tens to **hundreds** of years) the drawdown effects should fully diminish, except in the vicinity of the open pit where the effects would be in perpetuity.

Impacts to Basin Water Budgets

Potential impacts to the water budgets of the basins in the HSA resulting from mine-related ground water drawdown under the Slower, Longer Project Alternative would be similar in scale to those of Proposed Action, as described in Section 3.2.3.3.2, but differing in time frames.

The estimated changes in annual ground water budgets under the Slower, Longer Project Alternative indicate that the mine-induced drawdown associated with pit dewatering and KVCWF pumping is predicted to result in a decrease in **ET** in all basins of the HSA. Most of the predicted decrease (95 percent at 50 years after the end of mine-related pumping) in **ET** within the HSA occurs in Kobeh Valley. The predicted water table drawdown in Kobeh Valley extends to the mapped phreatophyte areas northwest of Bean Flat and east of Lone Mountain (Figure 3.2.2**6**). The predominant phreatophyte vegetation in these areas is greasewood. The simulated extinction depth for greasewood is 40 feet below the ground surface, and the ground water model results indicate that the magnitude of drawdown along the perimeter of these phreatophyte vegetation areas would exceed the extinction depth for some period of time (Montgomery et al. 2010). This could potentially lead to a **change in composition and percent**

cover of phreatophyte plants and an associated decrease in **ET** of ground water, as reflected in the estimated water budget changes listed in Tables 3.2-19 and 3.2-20.

Table 3.2-19: Estimated Change in Annual Ground Water Budgets in Final Year of Project (2099) Under the Slower, Longer Project Alternative, Relative to the No Action Alternative[1]

Budget Component	Antelope Valley	Diamond Valley	Kobeh Valley	Pine Valley (within the HSA)	Entire HSA
Change in Ground Water Inflow[2] (afy)					
Precipitation Recharge	0	0	0	0	0
Subsurface Inflow[4]	0	36 (52 from Pine Valley and -16 from Kobeh Valley)	205 (7 from Monitor Valley, 36 from Antelope Valley, and 162 from Pine Valley)	0	7 (from Monitor Valley to Kobeh Valley)
Net Change in Total Inflow	**0**	36	**205**	**0**	7
Change in Ground Water Outflow[2] (afy)					
Evapotranspiration[3]	-23	-72	-3,300	-25	-3,420
Net Ground Water Pumping	0	0	11,300	0	11,300
Subsurface Outflow[4]	36 (to Kobeh Valley)	0	16 (to Diamond Valley)	214 (52 to Diamond Valley and 162 to Kobeh Valley)	0
Net Change in Total Outflow	**13**	**-72**	**7,984**	**189**	**7,880**

[1] Estimation based on sources of data and methods described in Interflow (2011), including results from the calibrated numerical ground water model.

[2] Positive values indicate increase and negative values indicate decrease in water budget component or in net change in total inflow and outflow.

[3] Includes ET from phreatophyte areas and evaporation from playas and spring discharge.

[4] Source: Interflow (2011), Table 1.

Table 3.2-20: Estimated Change in Annual Ground Water Budgets 50 Years Post-Project (2149) Under the Slower, Longer Project Alternative, Relative to the No Action Alternative[1]

Budget Component	Antelope Valley	Diamond Valley	Kobeh Valley	Pine Valley (within the HSA)	Entire HSA
Change in Ground Water Inflow[2] (afy)					
Precipitation Recharge	0	0	0	0	0
Subsurface Inflow[4]	0	39 (35 from Pine Valley and 4 from Kobeh Valley)	171 (17 from Monitor Valley, 31 from Antelope Valley, and 123 from Pine Valley)	0	17 (from Monitor Valley to Kobeh Valley)
Net Change in Total Inflow	**0**	39	**171**	**0**	**17**
Change in Ground Water Outflow[2] (afy)					
Evapotranspiration[3,4]	-27	-117	-1,764	-49	-1,957

Budget Component	Antelope Valley	Diamond Valley	Kobeh Valley	Pine Valley (within the HSA)	Entire HSA
Net Ground Water Pumping	0	0	0	0	0
Subsurface Outflow[4]	31 (to Kobeh Valley)	0	4 (to Diamond Valley)	157 (35 to Diamond Valley, -1 to North Pine Valley, and 123 to Kobeh Valley)	-1
Net Change in Total Outflow	**4**	**-117**	**-1,760**	**108**	**-1958**

[1] Estimation based on sources of data and methods described in Montgomery et al. (2010), including results from the calibrated numerical ground water model.

[2] Positive values indicate increase and negative values indicate decrease in water budget component or in net change in total inflow and outflow.

[3] Includes ET from phreatophyte areas and evaporation from playas and spring discharge.

[4] Interflow (2011), Table 1.

In the final year of operations under the Slower, Longer Project Alternative (2099), the estimated available ground water in Diamond Valley is predicted to be reduced by 72 afy as a result of open pit dewatering and KVCWF pumping, relative to the No Action Alternative at that same point in time (Table 3.2-11). An increase in subsurface inflow to Diamond Valley of 36 afy (52 afy from Pine Valley and a decrease of 16 afy from Kobeh Valley) is also predicted to occur as a result of open pit dewatering (since the pit is mostly located within the Diamond Valley basin). Fifty years after the end of operations under the Slower, Longer Project Alternative (2149), the estimated available ground water in Diamond Valley is predicted to be reduced by 117 afy as a result of pit-lake capture and previous KVCWF pumping, relative to the No Action Alternative at that same point in time (Table 3.2-12). In 2149, a predicted increase in subsurface inflow to Diamond Valley of 39 afy (35 afy from Pine Valley and 4 afy from Kobeh Valley) results from pit-lake capture. The predicted mine-related reduction in available ground water in Diamond Valley within 50 years post-Project under the Slower, Longer Project Alternative (up to 117 afy) is minor (0.2 percent) in comparison to the estimated consumptive use of ground water for agricultural purposes in Diamond Valley (55,800 afy) in 2009.

The quantity of ground water leaving the HSA by subsurface flow and discharging into northern Pine Valley (the only location of subsurface outflow from the HSA) is not predicted to change significantly as a result of mine dewatering and KVCWF pumping.

- **Impact 3.2.3.7-4:** Ground water flow modeling indicates that there could be up to approximately 25 percent decrease in **ET** of ground water in Kobeh Valley due to **a change in** phreatophyte **composition and percent cover** resulting from temporary mine-induced drawdown.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

- **Impact 3.2.3.7-5:** Ground water flow modeling indicates that there could be a time-varying net change (decrease or increase) in the available ground water in Diamond

Valley that is due solely to effects of the Slower, Longer Project Alternative by the end of mining and milling operations and for at least 50 years post-Project; however, the magnitude of the predicted changes are less than 0.2 percent, compared to the overall ground water budget for Diamond Valley.

Significance of the Impact: The impact is not considered significant.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Consumptive Losses

Potential impacts to water resources in the HSA resulting from long-term consumptive use of ground water under the Slower, Longer Project Alternative would be the same as for the Proposed Action, as described in Section 3.2.3.3.2. Therefore, they are not repeated here.

- **Impact 3.2.3.7-6:** Consumptive use of water during mining and milling operations would support a beneficial use and would not be expected to adversely impact water resources, and EML would have adequate water rights to cover the consumptive use. Long-term consumptive use of ground water by evaporation from the pit lake surface is predicted to be approximately 100 gpm (161 afy) and would continue in perpetuity. This consumptive loss would occur under the Slower, Longer Project Alternative (and the Proposed Action), and so represents a negative impact compared to the No Action Alternative. The 161 afy is less than 0.1 percent of the combined water budget for the Kobeh and Diamond Valleys.

  Significance of the Impact: Impacts during mining and milling operations are less than significant. After those operations cease, direct impacts of pit lake evaporation do not result in significant impacts.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Potential Impacts Due to Subsidence

The basis for this potential impact and the assessment methodology are similar to those described for the Proposed Action in Section 3.2.3.3.2; therefore, they will not be repeated here. The numerical model shows that under the Slower, Longer Project Alternative, subsidence of up to approximately 1.5 feet would occur in the northern part of the KVCWF area (Figure 3.2.33). The projected lateral extent of subsidence greater than one-half-foot is approximately four miles in radius and is centered on the northern part of the well field area. There is no other predicted land subsidence due to the effects of mine pit dewatering or KVCWF pumping under the Slower, Longer Project Alternative within the HSA.

Potential for Changes to Aquifer Productivity

The greatest potential for permanent deformation would occur in the finer grained sediments (clays and silty clays) that are not the primary water-bearing materials in the basin-fill aquifer of

Kobeh Valley. The result would be a slight loss in aquifer interbed storage, but no noticeable loss in aquifer productivity of water supply wells. Thus, the potential impacts to the aquifer due to subsidence under the Slower, Longer Project Alternative, if any, would be localized and are not considered significant.

- **Impact 3.2.3.7-7:** A small change in aquifer characteristics is expected to result from compaction of the aquifer materials. Ground subsidence of greater than one-half-foot is projected to extend approximately four miles quasi-radially from the center of subsidence effects in the northern part of the KVCWF area, and a maximum subsidence of approximately 1.5 feet is projected in a small part of that central area. The subsidence would result primarily from a permanent reduction in porosity of the finer grained sediments (clays and silty clays), which are not the primary water-bearing materials in the basin-fill aquifer.

  Significance of the Impact: The potential for the Kobeh Valley basin-fill aquifer to transmit or store water is not expected to be significantly impacted.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

Potential for Significant Land Surface Alteration

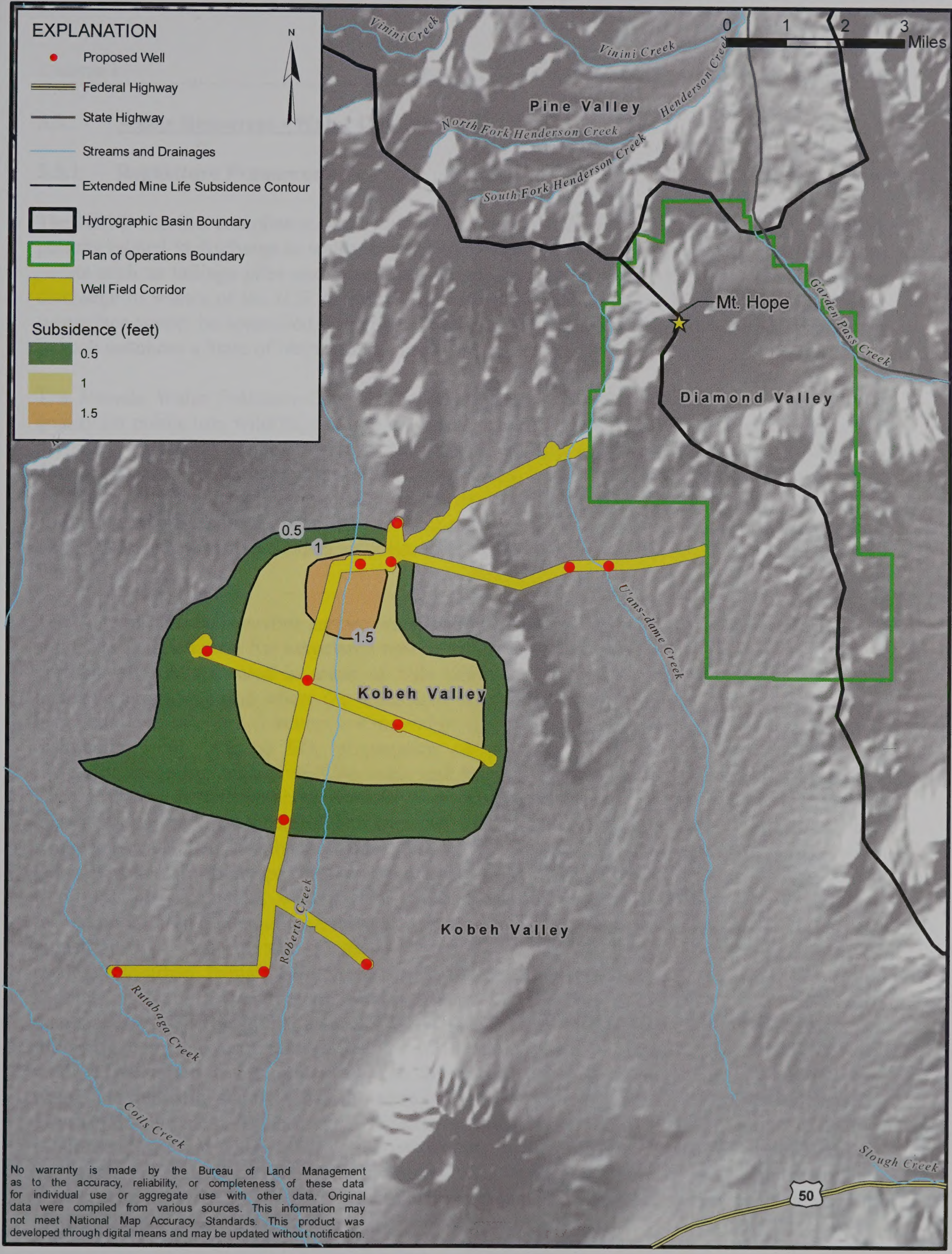
Potential impacts to ground surface conditions (fissuring or alteration of drainage patterns) resulting from dewatering-induced land subsidence under the Slower, Longer Project Alternative would be the same as for the Proposed Action, as described in Section 3.2.3.3.2. Therefore, they are not repeated here.

- **Impact 3.2.3.7-8:** Differential subsidence could result in the development of fissures, creating a potential to degrade waters of the state. Fissures could provide a preferential flow path for uncontained process fluids or chemical or hydrocarbon releases. Capture of surface runoff by fissures, may form erosional fissure gullies, which represent a safety risk to wildlife, livestock, wild horses, and people.

  Significance of the Impact: The impact would be significant if fissure gullies formed.

- **Mitigation Measure 3.2.3.7-8:** EML would be responsible for specifically monitoring for fissure gully development. If fissure gullies form, they would be filled in with clean, coarse-grained alluvium, with the intent of providing a rapid means of dissipation for any surface water entering the fissure, thereby reducing the propagation of the fissure through continued erosion. The fill material then would be seeded with a BLM-approved seed mix.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.2.3.7-8 would be effective at mitigating the fissures that develop. Any residual effects of fissure development would be fully mitigated during the life of the Project.


EXPLANATION
N
● Proposed Well
Federal Highway
State Highway
Streams and Drainages
Extended Mine Life Subsidence Contour
Hydrographic Basin Boundary
Plan of Operations Boundary
Well Field Corridor
Subsidence (feet)
0.5
1
1.5
0 1 2 3 Miles
Vinini Creek
Vinini Creek
Henderson Creek
Pine Valley
North Fork Henderson Creek
South Fork Henderson Creek
Henderson Creek
Mt. Hope
Garden Pass Creek
Diamond Valley
0.5
1
1.5
Kobeh Valley
U'ans-dame Creek
Roberts Creek
Kobeh Valley
Rutabaga Creek
Coils Creek
Slough Creek
50

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FILE NAME: p1635_Fig3-2-33_ExtendedAlt_SubsidenceKobehValley.mxd

BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Slower, Longer Project Alternative Predicted Subsidence in Year 88 (2099), Relative to 2009 Conditions

Figure 3.2.33

3.3 Water Resources - Water Quality

3.3.1 Regulatory Framework

The NDEP requires compliance with National Pollution Discharge Elimination System (NPDES) permits related to discharge to waters of the U.S. of wastewater to surface waters from discharge points such as tailings piles and wastewater ponds, as well as with NPDES permits related to discharge to waters of the U.S. of storm water runoff. NDEP also requires that discharges into subsurface waters be controlled if the potential for contamination of ground water supplies exist. In such instances a State of Nevada zero-discharge permit is required.

The Nevada Water Pollution Control Law provides the state the authority to maintain water quality for public use, wildlife, existing industries, agriculture, and the economic development of the site. The NDEP defines waters of the state to include surface water courses, waterways, drainage systems, and underground water. The Nevada Water Pollution Control Law also gives the State Environmental Commission authority to require controls on diffuse sources of pollutants, if these sources have the potential to degrade the quality of the waters of the state. The EPA has also granted Nevada authority to enforce **DWS** established under the Safe Drinking Water Act.

The State of Nevada classifies surface water bodies into four classes; Class A, Class B, Class C, and Class D. Each class has associated water quality standards. Class A waters include waters or portions of waters located in areas of little human habitation, no industrial development or intensive agriculture and where the watershed is relatively undisturbed by man's activity. The beneficial uses of Class A waters are municipal or domestic supply, or both, with treatment by disinfection only, aquatic life, propagation of wildlife, irrigation, watering of livestock, recreation including contact with the water and recreation not involving contact with the water. Class B waters include waters or portions of waters that are located in areas of light or moderate human habitation, little industrial development, light-to-moderate agricultural development, and where the watershed is only moderately influenced by man's activity. The beneficial uses of Class B water are municipal or domestic supply, or both, with treatment by disinfection and filtration only, irrigation, watering of livestock, aquatic life and propagation of wildlife, recreation involving contact with the water, recreation not involving contact with the water, and industrial supply. Class C waters include waters or portions of waters that are located in areas of moderate-to-urban human habitation, where industrial development is present in moderate amounts, agricultural practices are intensive, and where the watershed is considerably altered by man's activity. The beneficial uses of Class C water are municipal or domestic supply, or both, following complete treatment, irrigation, watering of livestock, aquatic life, propagation of wildlife, recreation involving contact with the water, recreation not involving contact with the water, and industrial supply. Class D waters include waters or portions of waters located in areas of urban development, highly industrialized or intensively used for agriculture or a combination of all the above and where effluent sources include a multiplicity of waste discharges from the highly altered watershed. The beneficial uses of Class D waters are recreation not involving contact with the water, aquatic life, propagation of wildlife, irrigation, watering of livestock, and industrial supply, except for food processing purposes.

Roberts Creek and its tributaries are Class A water bodies from the headwaters to the reservoir and Class B water bodies below the reservoir. Denay Creek and its tributaries from the headwaters to Tonkin Reservoir and the Reservoir itself are Class A water bodies. Denay Creek below Tonkin Reservoir is a Class B water body. J.D. ponds are Class C water bodies. These water bodies have aquatic life, livestock, recreation, irrigation, and other beneficial uses. All other perennial streams in the vicinity of the Project Area are unclassified.

The applicable surface water and ground water quality standards for inorganic compounds in Nevada are summarized in Table 3.3-1. These standards are based both on aquatic toxicity criteria and the proposed use of the water.

3.3.2 Affected Environment

3.3.2.1 Study Methods

Water Resources - Water Quality information, descriptions, and data are based on technical reports addressing geochemistry and pit water quality that were prepared for EML. The reports include the Mount Hope Project Waste Rock and Pit Wall Rock Characterization Report (SRK 2008d) and the Mount Hope Project Final Pit Lake Geochemistry Report (SWS 2010).

3.3.2.2 Existing Conditions

3.3.2.2.1 Surface Water Quality

Surface water from springs and perennial streams in the Mount Hope area is generally of good quality, i.e., meeting all Nevada water quality standards at most locations (SRK 2008d). The locations where water quality standards are not met tend to fall into one of four general categories:

1. Waters that have elevated TDS, SO_4, or pH. In xeric environments, some locations have water that has undergone extensive evaporation. This evaporation leads to elevated levels of TDS and SO_4, as well as elevated pH;
2. Spring waters with elevated Mn or Fe. Mn and Fe are naturally mobile under the reducing conditions of most ground water; therefore, their concentrations would be higher, often exceeding regulatory standards. However, when these waters emanate into the oxidizing conditions found in surface waters, the Fe and Mn in these waters would rapidly precipitate;
3. Anomalous elevated metals in a single sample. At three locations, metals are found above regulatory limits for a single sample. All other samples at these locations are below regulatory limits and usually below detection; and
4. The Zinc Adit. At the Mount Hope mine site there is water emanating from the Zinc Adit. Prior to discharge from the adit, this water migrates through the zones of mineralization in the Mount Hope ore deposit where propylitically altered rock, enriched with sulfide minerals and trace elements, provides the water with its unique chemical signature. This mineralized material would be removed through the development of the open pit under the Proposed Action. In addition, the source of the water discharging from the adit and the adit itself would be removed.

3.3.2.2.2 Ground Water Quality

The applicable ground water quality standards for inorganic compounds in Nevada is summarized in Table 3.3-1 under the Maximum Contaminate Levels (MCLs) column. These standards are based both on aquatic toxicity criteria and the proposed use of the water, and with the exception of the aquatic life standards are the same for surface water.

Similar to the surface water in the vicinity of Mount Hope, ground water is generally of good quality. Similar to the spring data, there are some elevated levels of Mn, and elevated pH over the standard of 8.5.

Near the ore deposit, reducing conditions created by the presence of sulfides in the ore result in water from wells commonly exceeding regulatory standards for Fe and Mn, with several wells also having elevated TDS and SO_4. Well IGM-169 has elevated levels of fluoride, Al, and As present in its water, likely related to the abundant sulfide mineralization observed in the drill cuttings from the well. These reported data are from an open borehole as opposed to the standard method of obtaining data from a completed monitoring well. The pH of IGM-169 is unusual in that it has values below the NDEP standard of 6.5 to 8.5; however, the pH values generally ranged from 6.8 to 7.2 in the remainder of the sample sites. This well is located in the upper propylitic alteration zone of the ore deposit, where this type of chemistry signature in the water would be expected.

Table 3.3-1: Standards for Toxic Materials Applicable to Designated Waters

Chemical	Maximum Contaminate Levels (mg/L)	Aquatic Water Quality Micrograms per liter (µg/L)	Irrigation (µg/L)	Watering Livestock (µg/L)
Aluminum	0.2	-	-	-
Antimony	0.006	-	-	-
Arsenic	0.010	-	100[b]	200[c]
Arsenic (III)	-	-	-	-
1-hour average	-	342[a,e]	-	-
96-hour average	-	180[a,e]	-	-
Barium	2	-	-	-
Beryllium	0.004	-	100[b]	-
hardness≤75mg/L	-	-	-	-
hardness≥=75mg/L	-	-	-	-
Boron	-	-	750[a]	5,000[c]
Cadmium	0.005	-	10[d]	50[c]
1-hour average	-	0.85 exp {1.128In(H)-3.828][a,e]	-	-
96-hour average	-	0.85 exp {0.7852In(h)-3.490}[a,e]	-	-
Chromium (total)	0.1	-	100[c]	1,000[c]
Chromium (VI)	-	-	-	-
1-hour average	-	15[a,e]	-	-
96-hour average	-	10[a,e]	-	-
Chromium (III)	-	-	-	-
1-hour average	-	0.85 exp {0.8190In(H)+3.688}[a,e]		-
96-hour average	-	0.85 exp {0.8190In(H)+1.561}[a,e]		-
Copper	1.0	-	200[c]	500[c]
1-hour average	-	0.85 exp{0.9422In(H)-1.464}[a,e]	-	-

Chemical	Maximum Contaminate Levels (mg/L)	Aquatic Water Quality Micrograms per liter (µg/L)	Irrigation (µg/L)	Watering Livestock (µg/L)
96-hour average	-	0.85 exp {0.8545In(H)-1.465}^{a,e}	-	-
1-hour average	-	22^{a}	-	-
Cyanide	0.2	-	-	-
96-hour average	-	5.2^{a}	-	-
Fluoride	0.14	-	1,000^{c}	2,000^{c}
Iron	0.3	1,000^{a}	5,000^{c}	-
Lead	0.015	-	5,000^{c}	100^{c}
1-hour average	-	0.50 exp {1.273In(H)-1.460}^{a,e}	-	-
96-hour average	-	0.25 exp {1.273In(H)-4.705}^{a,e}	-	-
Manganese	0.05	-	200^{c}	-
Mercury	0.002	-	-	10^{c}
1-hour average	-	2.0^{a,e}	-	-
96-hour average	-	0.012^{a}	-	-
Molybdenum	-	19^{d}	-	-
Nickel	-	-	200^{c}	-
1-hour average	-	0.85 exp {0.8460In(H)+3.3612}^{a,e}		-
96-hour average	-	0.85 exp {0.8460In(H)+1.1645}^{a,e}		-
Selenium	0.05	-	20^{c}	50^{c}
1-hour average	-	20^{a}	-	-
96-hour average	-	5.0^{a}	-	-
Silver	0.1	0.85 exp {1.72In(H)-6.52}^{a,e}	-	-
Sulfate	250	-	-	-
Sulfide (Undissociated hydrogen sulfide)	-	2^{a}	-	-
Thallium **(Tl)**	0.002	-	-	-
Zinc	5	-	2,000^{c}	25,000^{c}
1-hour average	-	0.85 exp {0.8473In(H)+0.8604}^{a,e}		-
96-hour average	-	0.85 exp {0.8473In(H)+0.7614}^{a,e}		-

[1] Single concentration limits and 24-hour average concentration limits must not be exceeded. One-hour average and 96-hour average concentration limits may be exceeded only once every three years. See reference a.

[2] Hardness is expressed as mg/L calcium carbonate.

[3] If a criterion is less than the detection limit of a method that is acceptable to the division, laboratory results which show that the substance was not detected would be deemed to show compliance with the standard unless other information indicates that the substance may be present.

[4] If a standard does not exist for each designated beneficial use, a person who plans to discharge waste must demonstrate that no adverse effect would occur to a designated beneficial use. If the discharge of a substance would lower the quality of the water, a person who plans to discharge waste must meet the requirements of NRS 445A.565.

[5] The standards for metals are expressed as total recoverable, unless otherwise noted.

[a] EPA, Pub. No. EPA 440/5-86-001, Quality Criteria for Water (Gold Book) (1986).

[b] EPA, Pub. No. EPA 440/9-76-023, Quality Criteria for Water (Red Book) (1976).

[c] National Academy of Sciences, Water Quality Criteria **1972** (Blue Book) **(1973)**.

[d] California State Water Resources Control Board, Regulation of Agricultural Drainage to the San Joaquin River: Appendix D, Water Quality Criteria (March 1988 revision).

[e] This standard applies to the dissolved fraction. (Added to NAC by Environmental Commission, eff. 9-13-85; A 9-25-90; 7-5-94; A 11-29-95).

Source: NAC 445A.144, which states, "except as otherwise provided in this section, the following standards for toxic materials are applicable to the waters specified in NAC 445A.123 to 445A.127, inclusive, and NAC 445A.145 to 445A.225, inclusive". If the standards are exceeded at a site and are not economically controllable, the commission would review and adjust the standards for the site.

Overall, the ground water from within the ore deposit and from the surrounding area has relatively high levels of alkalinity (generally over 100 mg/L calcium carbonate [$CaCO_3$]) and somewhat elevated levels of SO_4 (generally over 100 mg/L as SO_4, ranging up to 1,000 mg/L as SO_4). These waters generally fall into the classification as calcium bicarbonate to calcium sulfate waters. **The samples of ground water from the Project Area consistently exceeded the Nevada reference values for Mn, with values that range from 0.0076 to 25 mg/L. Less frequent exceedances, but still numerous, were Fe, Al, pH, SO4, TDS, and F (SRK 2008a).**

3.3.2.2.3 Waste Rock Characterization

Characterization Assessment Plan

Ore and waste rock from the Mount Hope deposit has been extensively characterized by SRK (2008d). The Waste Rock Report presents a detailed scheme for characterizing waste rock that incorporates whole rock analysis, ABA, MWMP testing, NAG testing, mineralogical characterization, and HCTs (Figure 3.3.1).

As a porphyry sulfide ore body, the deposit has very low levels of sulfide while having almost no carbonate to neutralize any acid that the low levels of sulfide may generate. Therefore, the characterization of waste rock focuses on determining the threshold at which sulfide overcomes the acid generating capacity of the rock and causes water quality issues.

Whole Rock Analyses

Whole rock analyses were conducted on 250 samples from the Mount Hope deposit using induced coupled plasma-mass spectrometry (ICP-MS). Due to the very nature of an orebody, there were observed enrichments in several elements, including silver (Ag), As, Cd, Mo, S, Sb, Se, Sn, and Zn throughout the orebody. In general, the enrichment was correlated more with the degree of enrichment than the lithology type. In the outer phyllic and argillic alteration halos, Th, Pb, and Cu are also present. The highest degree of elemental enrichment is observed in the skarn mineralization on the east side of the proposed open pit, which is associated with Zn sulfide replacement mineralization. The enriched Zn zone is where previous mining occurred during the 1940s. The skarn zone is also enriched in beryllium (Be), Fe, Pb, Sn, Mn, and S. Whole rock analyses did not analyze for fluorine (F) as an element, due to the limitations of the digestion method, (dissolving samples in hydrofluoric acid). However, mineralogical analysis indicated that elevated levels of fluorite are present in the skarn, potassic, and biotite alteration zones.

Mineralogic Analyses

Mineralogic analyses of the deposit have been conducted by SRK (2008d) and many other exploration programs. The key findings show that there is very little carbonate present (except in the outer propylitic alteration zone) in the deposit. Molybdenite and pyrite (PAG sulfides) are present in the main ore zone; however, in comparatively low concentrations.

Static Testing

Static testing included MWMP, ABA, and NAG testing.

Meteoric Water Mobility Procedure Test Results

MWMP testing was conducted on 137 samples. MWMP testing provides an indication of whether rocks would leach constituents. However with sulfide-bearing materials, the results of the MWMP testing provide only an initial indication of the potential release of metals. Subsequent sulfide oxidation in a ore deposit, for which the MWMP test is not designed, would release additional constituents. As there is little oxidation in the deposit, MWMP testing primarily guided the selection of additional samples. MWMP testing did indicate that some samples (primarily from the phyllic, argillic, and silicic alteration types) generated several metals (including Al, Cu, Cd, Fe, Mn, and Zn) at elevated levels and low pH (less than 6.5).

Acid Base Accounting Test Results

ABA testing was also conducted on 137 core samples and 1,546 pulp samples using the modified Sobek method (Lawrence and Wang 1997). In short, this method measures the amount of sulfide and SO_4 present in the rock using LECO analyses, and total inorganic **carbon** (C) by a titration method. The S and C values are then converted to acid equivalence to assess whether the rock has the potential to generate acid.

The method for calculating the acidification potential (AP) is based on the stoichiometry of the reaction of pyrite and the amount of sulfide S is multiplied by a coefficient to convert the value to an equivalent amount of acidity in terms of tons $CaCO_3$/1,000 tons (Ktons) rock to give the equivalent amount of acid the rock can generate. Similarly, based on the amount of inorganic C measured in the rock, the carbonate is converted to an equivalent neutralizing potential of $CaCO_3$ presented also in tons $CaCO_3$/Ktons rock to give the neutralization potential (NP).

The net neutralization potential (NNP) is the AP subtracted from the NP: NNP=NP-AP.

If the NNP is negative, there is more AGP than neutralizing potential, and the rock has the potential to generate acid. If the NNP is positive, the rock likely has an excess of neutralization capacity. There is an assumed stoichiometry of reactions that does not always strictly apply to all minerals because there is uncertainty associated with these measurements. Kinetic factors may affect the generation or consumption of acid. NNP results are characterized as three groups:

- If NNP is greater than 20 tons $CaCO_3$/Ktons, the rock is net neutralizing;
- If the NNP is between 20 and -20 tons $CaCO_3$/Ktons, the rock is assumed to have an uncertain or weak AGP; and
- If the NNP is less than -20, the rock is characterized as strongly acidic.

The AP and NP results from the deposit representative of the ore deposit geology and alteration types. Histograms of total S (Figure 3.3.2) and total C (Figure 3.3.3) indicate that both sulfide (with the majority of the samples below 0.3 percent sulfide) and carbonate (with the majority of the samples also below 0.3 percent) are very low in the ore and waste rock. Many samples have very low sulfide and carbonate values; therefore, a plot of NNP versus sulfide S (Figure 3.3.4) shows that most samples are very close to zero, with a tail of acid generating samples trailing off at sulfide S values greater than 0.5 percent. Therefore, the majority of the samples at Mount Hope have an NNP value between -20 and 20 tons $CaCO_3$/Ktons rock, which is within the uncertain range for the NP.

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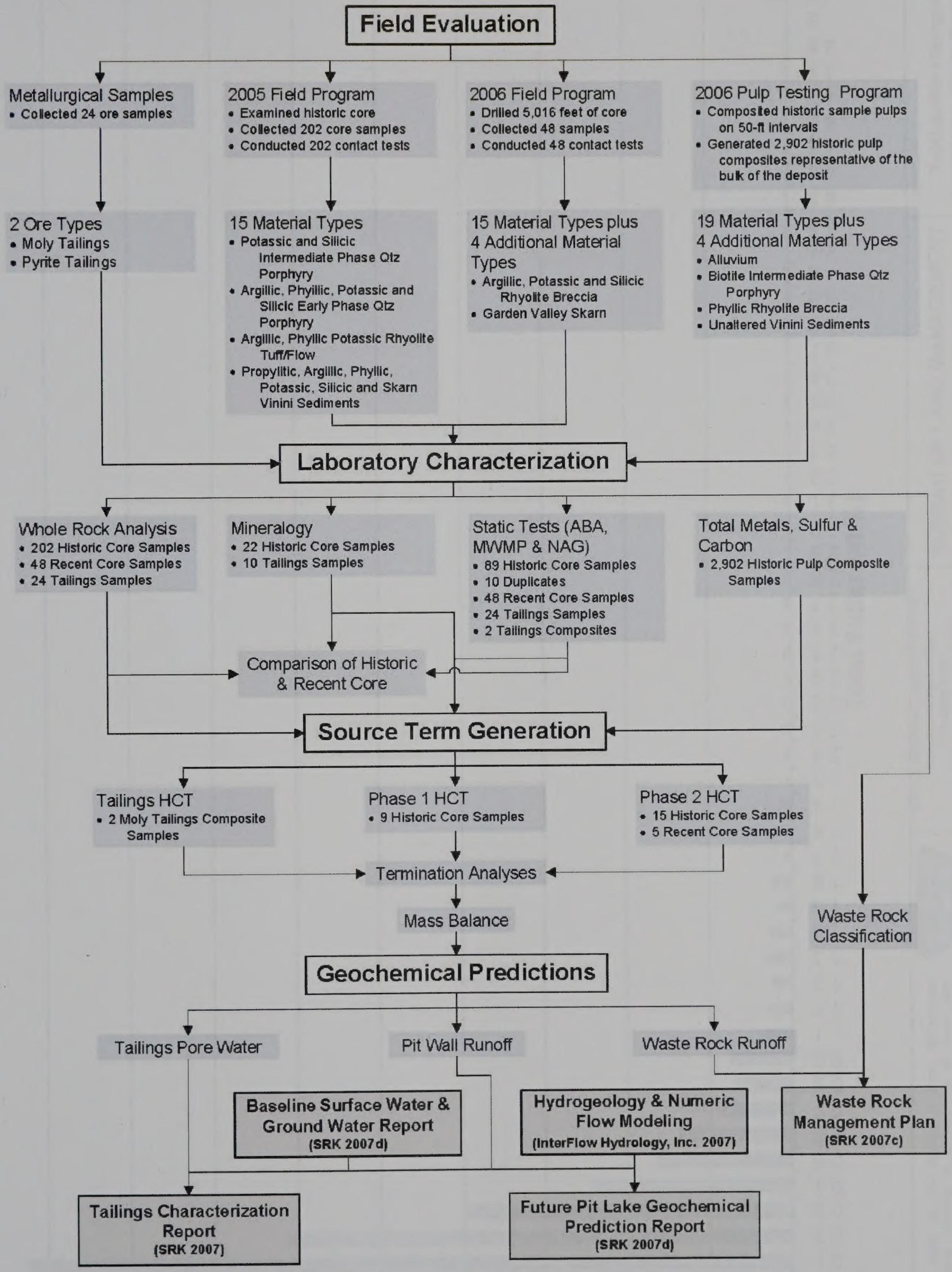

Field Evaluation

Metallurgical Samples
- Collected 24 ore samples

2005 Field Program
- Examined historic core
- Collected 202 core samples
- Conducted 202 contact tests

2006 Field Program
- Drilled 5,016 feet of core
- Collected 48 samples
- Conducted 48 contact tests

2006 Pulp Testing Program
- Composited historic sample pulps on 50-ft intervals
- Generated 2,902 historic pulp composites representative of the bulk of the deposit

2 Ore Types
- Moly Tailings
- Pyrite Tailings

15 Material Types
- Potassic and Silicic Intermediate Phase Qtz Porphyry
- Argillic, Phyllic, Potassic and Silicic Early Phase Qtz Porphyry
- Argillic, Phyllic Potassic Rhyolite Tuff/Flow
- Propylitic, Argillic, Phyllic, Potassic, Silicic and Skarn Vinini Sediments

15 Material Types plus 4 Additional Material Types
- Argillic, Potassic and Silicic Rhyolite Breccia
- Garden Valley Skarn

19 Material Types plus 4 Additional Material Types
- Alluvium
- Biotite Intermediate Phase Qtz Porphyry
- Phyllic Rhyolite Breccia
- Unaltered Vinini Sediments

Laboratory Characterization

Whole Rock Analysis
- 202 Historic Core Samples
- 48 Recent Core Samples
- 24 Tailings Samples

Mineralogy
- 22 Historic Core Samples
- 10 Tailings Samples

Static Tests (ABA, MWMP & NAG)
- 89 Historic Core Samples
- 10 Duplicates
- 48 Recent Core Samples
- 24 Tailings Samples
- 2 Tailings Composites

Total Metals, Sulfur & Carbon
- 2,902 Historic Pulp Composite Samples

Comparison of Historic & Recent Core

Source Term Generation

Tailings HCT
- 2 Moly Tailings Composite Samples

Phase 1 HCT
- 9 Historic Core Samples

Phase 2 HCT
- 15 Historic Core Samples
- 5 Recent Core Samples

Termination Analyses

Mass Balance

Waste Rock Classification

Geochemical Predictions

Tailings Pore Water

Pit Wall Runoff

Waste Rock Runoff

Baseline Surface Water & Ground Water Report
(SRK 2007d)

Hydrogeology & Numeric Flow Modeling
(InterFlow Hydrology, Inc. 2007)

Waste Rock Management Plan
(SRK 2007c)

Tailings Characterization Report
(SRK 2007)

Future Pit Lake Geochemical Prediction Report
(SRK 2007d)

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MOUNT HOPE PROJECT

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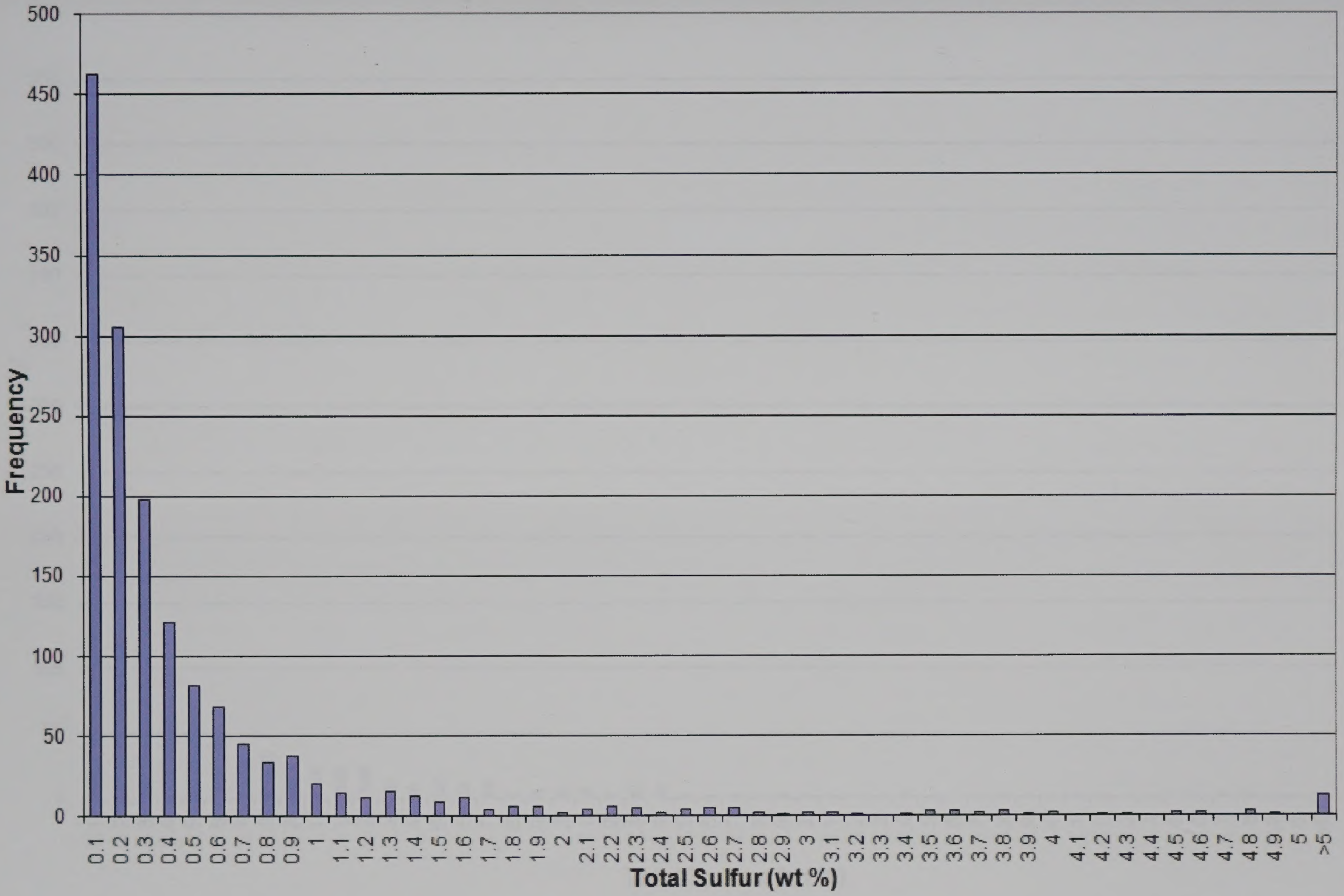
Characterization Program Flow Diagram

Figure 3.3.1



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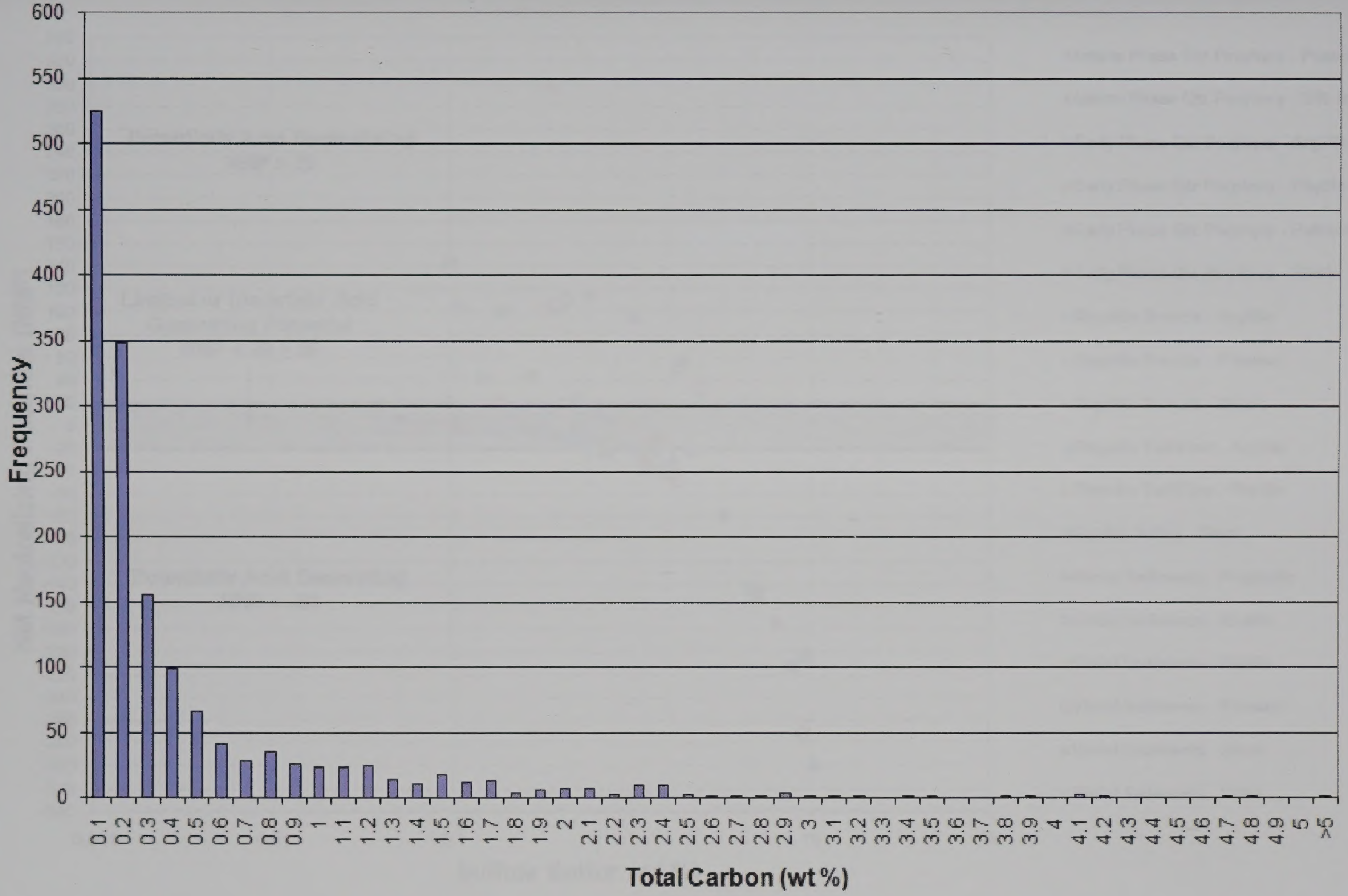
BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Total Sulfur Histogram for Mount Hope Waste Rock Samples

Figure 3.3.2



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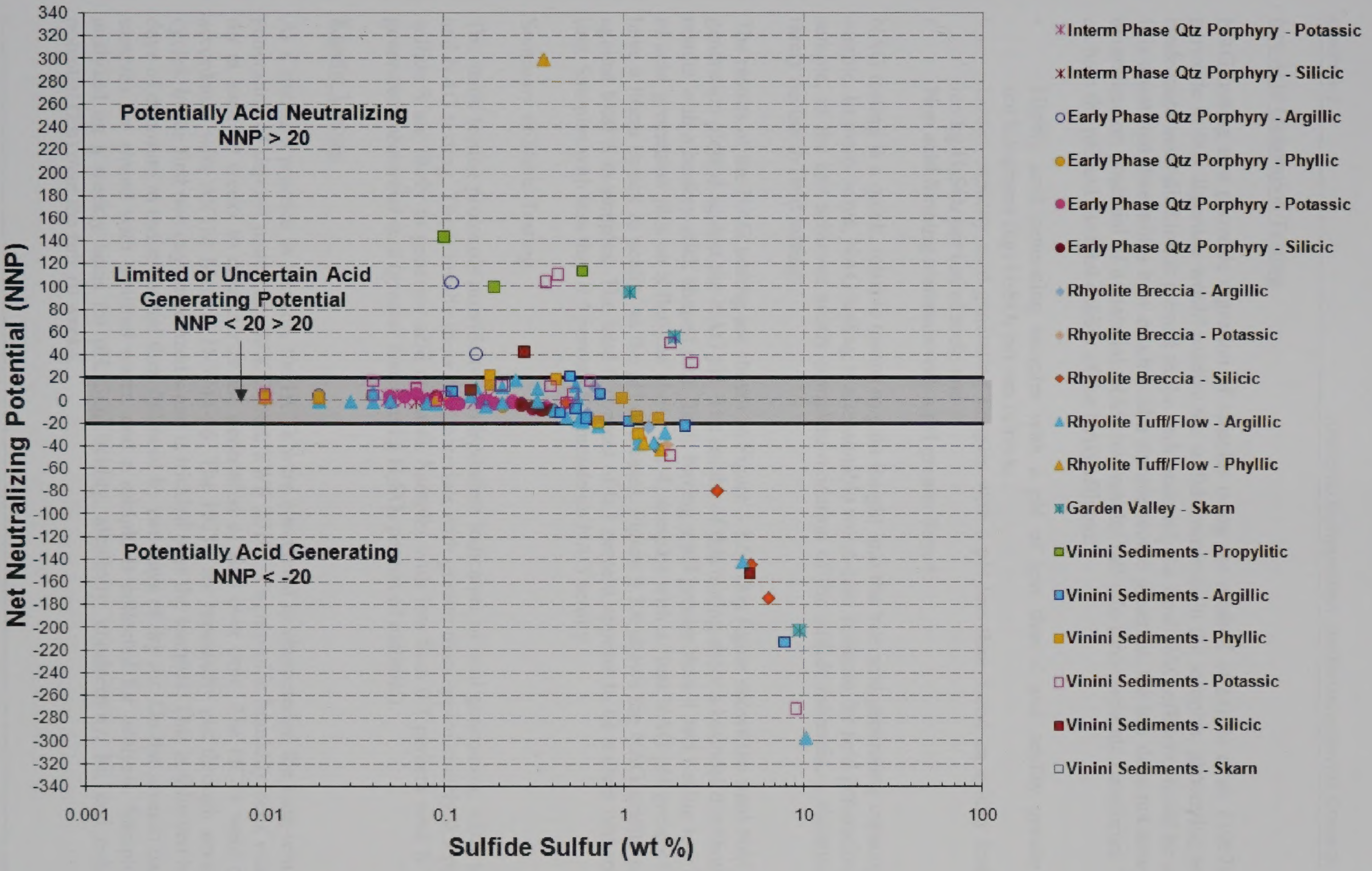
BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Total Carbon Histogram for Mount Hope Waste Rock Samples

Figure 3.3.3



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MOUNT HOPE PROJECT

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Net Neutralization Potential Versus Sulfide

Figure 3.3.4

Net Acid Generation Testing

NAG testing is a peroxide digestion of samples using the method of Miller et al. (1997). The peroxide in this digestion would oxidize the sulfide minerals in the samples, generating acid. If inadequate neutralization is present in the rock material, the final NAG effluent would be acidic. It is a test that determines how much acid a sample would generate, the test does not assess the neutralization potential of a material. NAG test results fall into three separate categories, based on both the pH and the total acidity of the NAG effluent:

- Highly acid generating samples with a pH of less than 4 and acidity greater than ten kilograms (kg) H_2SO_4 per ton of rock;
- Lower capacity acid generating samples with a pH less than 4 and an acidity less than ten kg H_2SO_4 per ton of rock; and
- Non acid forming materials with a pH greater than 4.

NAG testing is a quick, reliable means to gain insight into the true acid generating capacity of a sample. In many ways, NAG testing is a reasonable worst-case scenario for acid generation for a sample, as the test achieves nearly complete oxidation of the sulfide minerals, a situation that rarely occurs in field settings.

The results of the NAG testing are shown in Figure 3.3.5. This figure shows the final NAG acid generation plotted against the NAG pH. The results of this testing show a bimodal distribution of results with a hockey-stick shaped plot. Tests having a pH greater than 4 and having low levels of acid generation plot on a flat line above pH 4; samples with a final NAG pH greater than 4 have a linear uptick in acidity as the pH decreases. Figure 3.3.6 shows the NAG acidity plotted against total S in samples. The total S content of 0.3 percent appears to be a clear demarcation line. Samples with less than 0.5 percent S generate no NAG acidity.

Summary of Static Testing

The static testing protocols provide two independent indicators of acid generation, ABA testing and NAG testing. These results show that materials with greater than approximately 0.3 percent sulfide S are likely to generate acid material. Samples with less than 0.3 percent total S never generated substantial acid (greater than two kg H_2SO_4 per ton of material).

Kinetic Testing

As a standard practice in Nevada, the HCTs were conducted to characterize the long-term acid generation of deposit materials (SRK 2008d; SWS 2010). Twenty-nine humidity cells were run for at least 70 weeks to characterize the generation of acid over time. The HCTs were run in accordance with ASTM Method D-5744-96. The HCTs are repeatedly put through seven-day cycles. In the first two days deionized water is trickled over the samples. This is followed by two days of exposure to moist air and then followed by two days of dry air. On the seventh day, the samples are rinsed with distilled water, and a sample is collected for analysis. Samples are analyzed on a weekly basis for pH, SO_4, acidity, alkalinity, conductivity, Fe, and reduction potential (Eh) over the full 70 weeks.

The HCTs serve multiple purposes. At their most basic level, HCTs provide the most definitive indication of whether or not a specific sample would eventually generate acid. The secondary application of HCTs is to generate source terms for additional geochemical modeling to quantify how waste rock and pit wall materials would interact with the environment. It is common for the chemistry of an HCT to evolve over time. One common pattern seen in HCTs is a delayed onset of acid generation for several weeks and then the sample suddenly turns acidic. Conversely, some humidity cells react quickly and all the sulfide is consumed or where acid generation happens so quickly that no additional acid is generated after a few weeks and the sample eventually evolves to a circumneutral pH.

As previously stated, the first goal of HCTs is to determine if rocks would ultimately generate acid. In practice, these more rigorous kinetic tests support the detailed static testing program that these samples have undergone. The humidity cells provide excellent validation of any rock characterization assessment plan. If the acid base classification assessment plan is correct and protective of the environment (conservative), HCTs should not generate acid when ABA and NAG testing indicated that acid would not be generated.

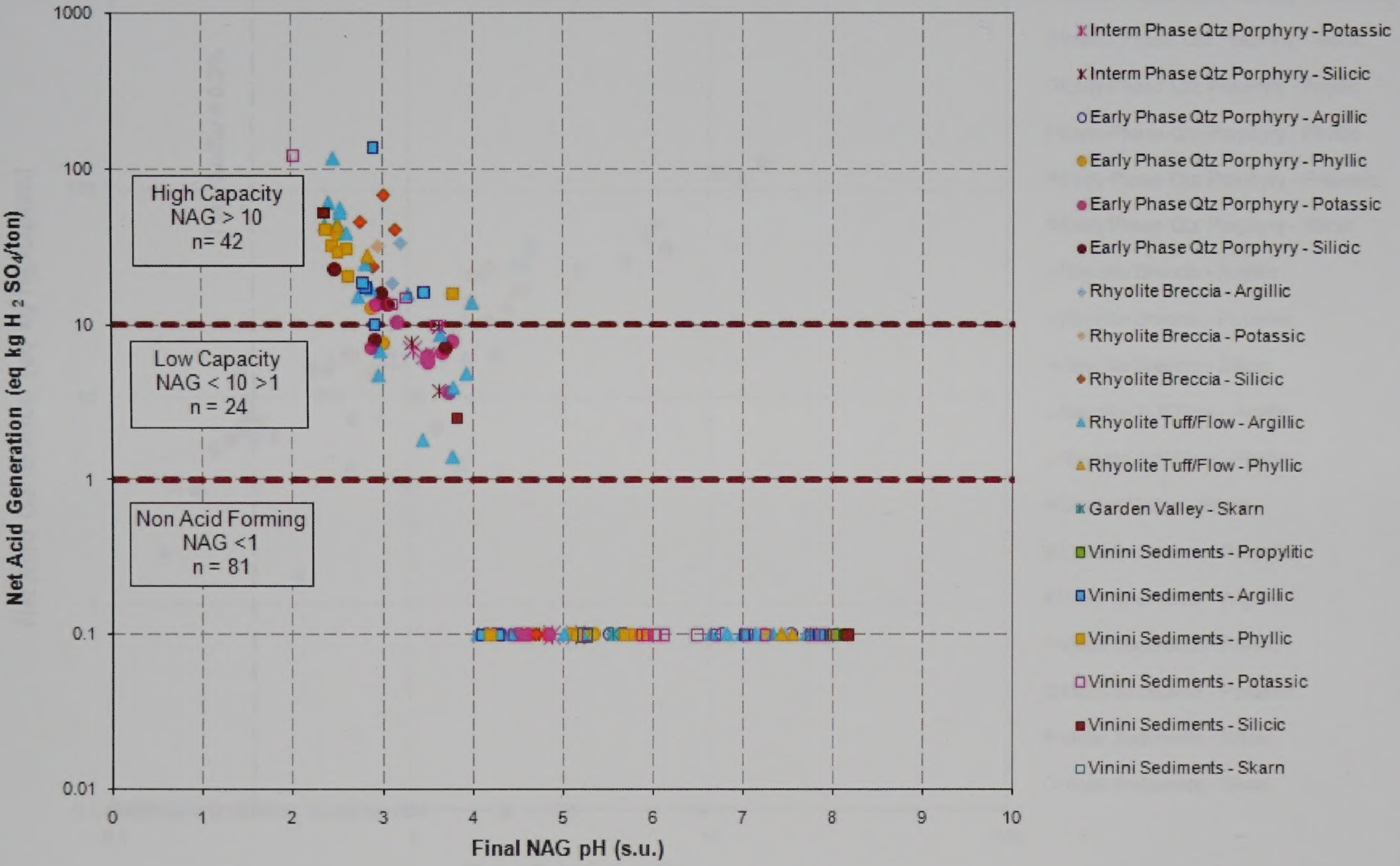
A comparison of the results of the HCTs to the static tests is presented in Table 3.3-2. Overall, 25 of the 29 cells have a behavior that comports with the predictions of the static testing. There are four samples (cells 9, 19, 26, and 30) for which either NAG or ABA static testing would predict that these samples would generate acid, but in fact, the HCTs did not. All samples that were predicted to be non-acid generating were found to be non-acid generating in the HCTs. These results are shown in Figures 3.3.7 and 3.3.8, which show that all samples that are below criteria identified in this study do not generate acid in HCTs. Overall, the HCTs are in excellent agreement with the static testing predictions. Where differences do arise between HCTs and static testing, the static testing tends to predict more acid generation than is found in HCTs.

Therefore, the static testing program appears to provide a conservative measure of whether or not a particular rock would generate acid.

HCT results also provide inputs into assessing the impacts to ground water and surface water quality from waste rock, tailings, and pit walls. The interpretation of the HCTs is discussed in detail in SRK 2008d and 2010. In short, the average concentrations of HCT effluents were used to provide baseline inputs to predict the water quality of waste rock drainage and pit lake water quality.

For some lithologic units, the HCT results show considerable variability within individual alteration and lithology types. For example, humidity cells 9, 18, and 31 are all from the Ordovician Vinni Formation with argillic alteration; however, all three cells have different pHs, and cells 18 and 31 are classified differently (18 as Non-PAG, 9 and 31 as PAG). Cells 18 and 31 both have similar levels of sulfide S (0.51 percent and 0.54 percent, respectively, and Cell 9 has a higher sulfide content of 2.41 percent). The observation of this amount of variability aids in the prediction of future environmental impacts at the mine, as it is important to understand this variability in assessing future effects.

Overall, the HCT effluents are generally stable and show no signs of becoming more acidic. Only one cell (Cell 6, a sample of potassic-altered Valmy Formation), showed any delayed onset of acid generation. The initial pH in the first week for Cell 6 was 3.2, but rose to pH 6.2 by week



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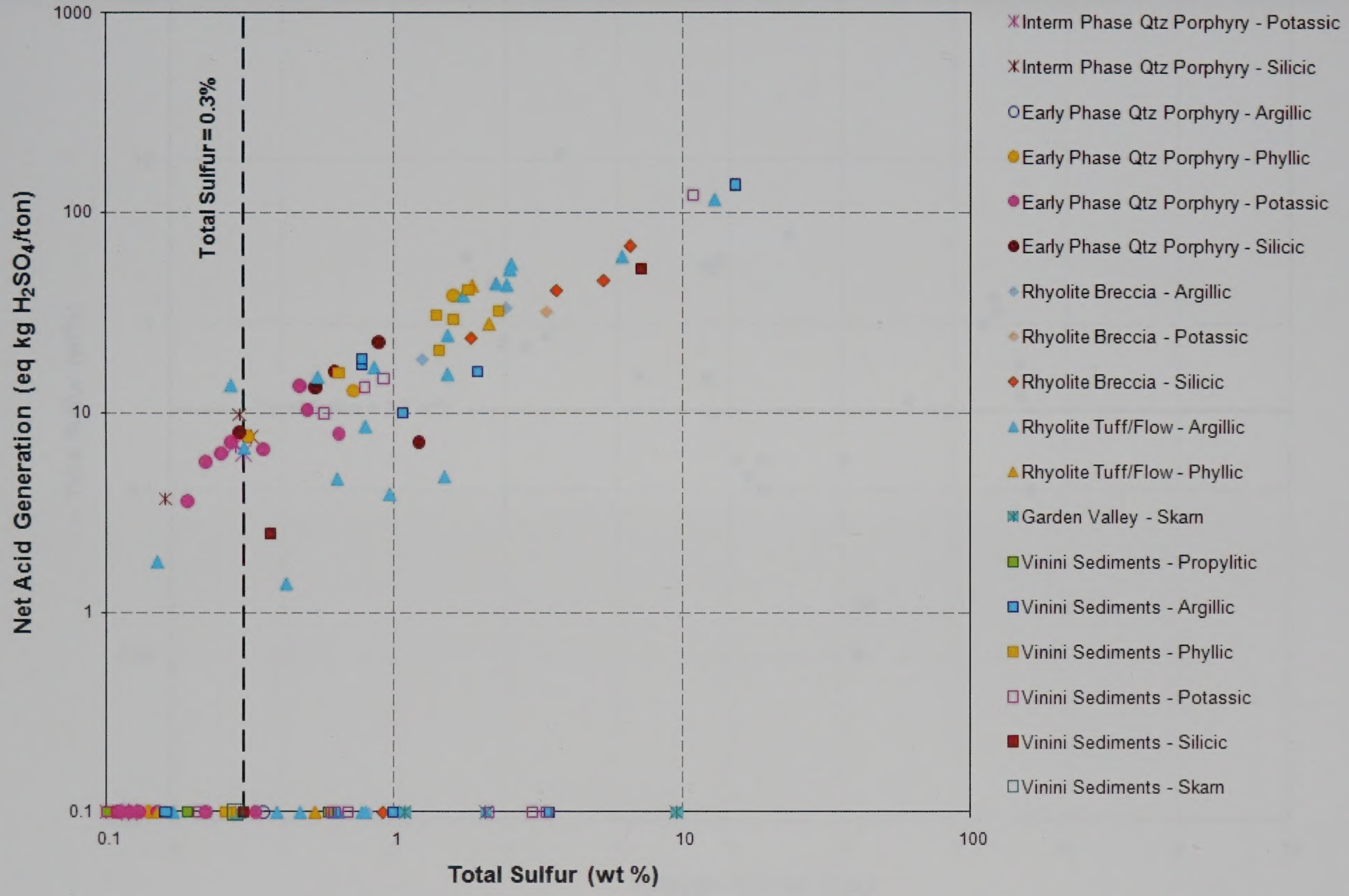
DRAWING TITLE:

Net Acid Generation Versus Net Acid Generation pH

Figure 3.3.5



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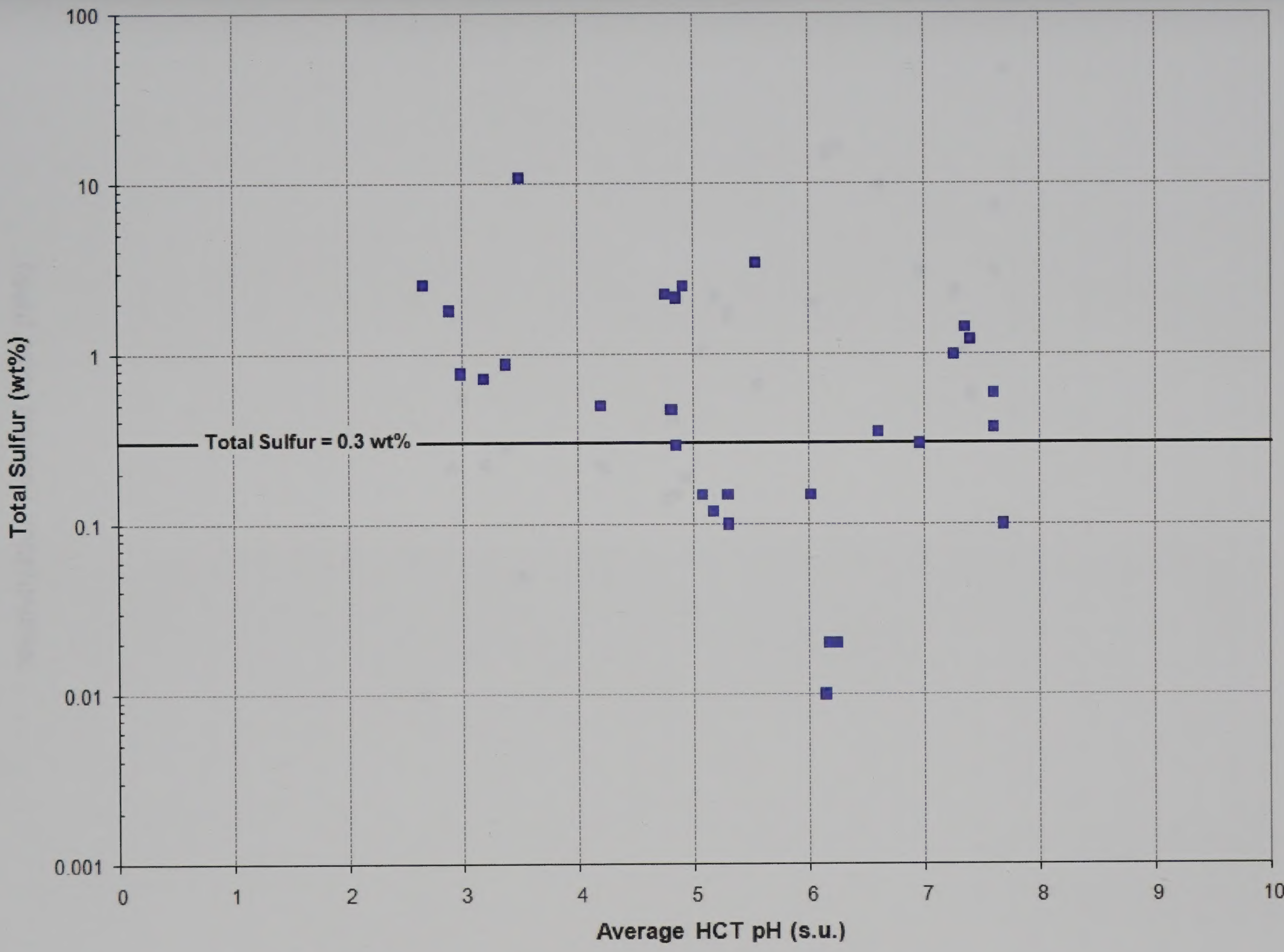
Total Sulfur Versus Net Acid Generation

Figure 3.3.6



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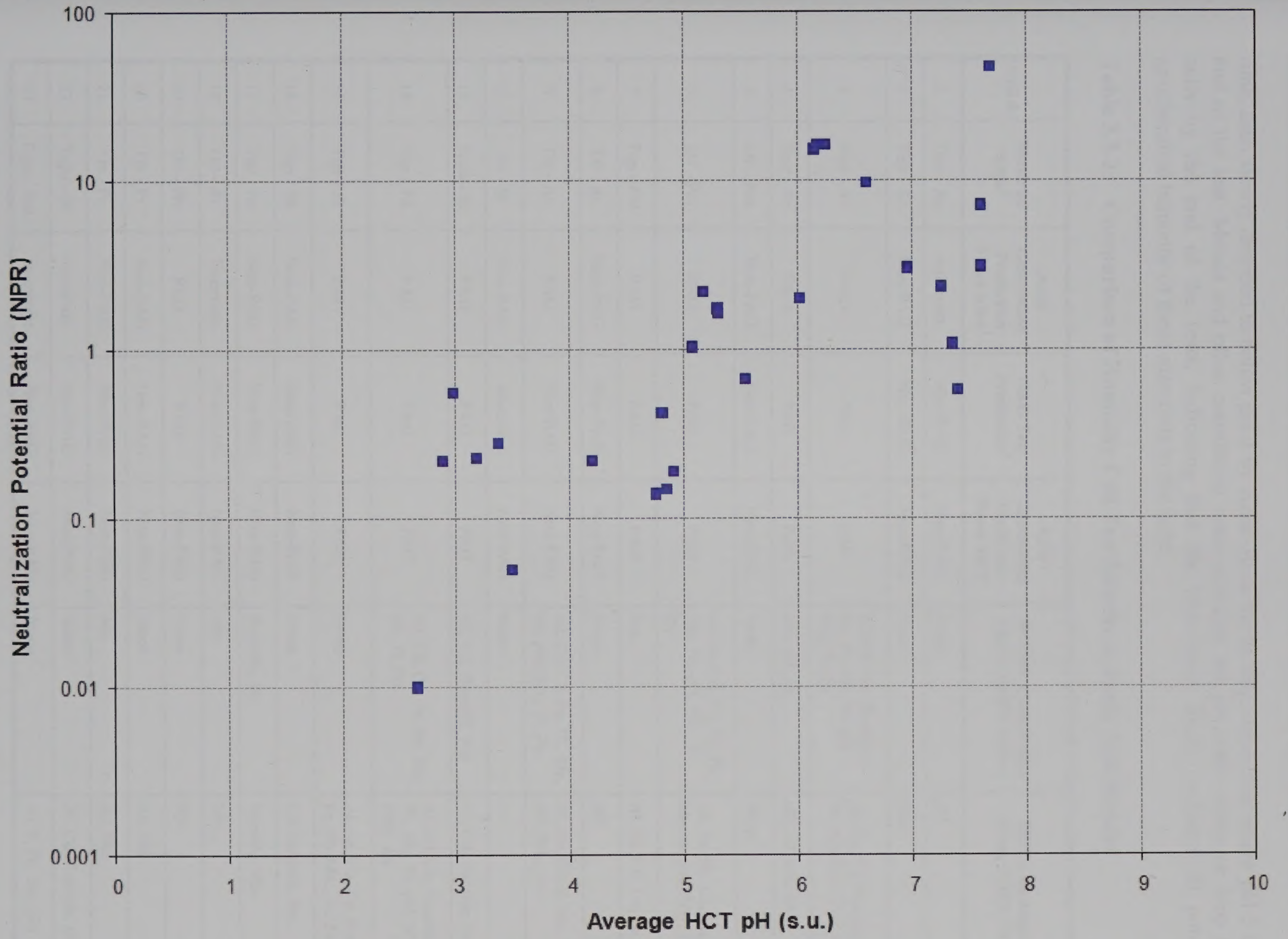
MOUNT HOPE PROJECT

DRAWING TITLE:

Total Sulfur Plotted Against the Average Humidity Cell pH

Figure 3.3.7



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DRAWING TITLE:

Neutralization Potential Ratio Plotted Against Average Humidity Cell pH

Figure 3.3.8

nine, then slowly dropped to below pH 3 by week 30 of the testing, remaining below pH 3 to the end of the test. Metals and other constituent concentrations are generally stable or drop in all cells by the end of the tests, indicating that the tests have likely captured all potential geochemical behavior of these materials in the field.

Table 3.3-2: Comparison of Humidity Cell Test Results to Static Test Results

Cell #	Material Type[2]	Acid Generation Prediction From ABA[1]	NAG Test Prediction[1]	Acid Generation Prediction From HCT	MWMP Constituents Above NDEP Values	HCT Constituents Above NDEP Values
1	Tmr - Ar	uncertain	Non-PAG	Non-PAG	None	pH
2	Tqp - Ar	Non-PAG	Non-PAG	Non-PAG	None	None
3	Tmr - Ar	PAG	PAG	PAG	Al, Cd, Cu, fluoride, Fe, Pb, Mn, Ni, pH, SO_4, Tl, Zn	Al, As, Cd, fluoride, Mn, Ni, pH, SO_4, Tl, Zn
4	Tmr - Ar	PAG	PAG	PAG	Mn, pH, Zn	pH, Al, Mn, Zn
5	Ov - Pot	Non-PAG	Non-PAG	Non-PAG	None	None
6	Ov - Pot	PAG	PAG	PAG	Al, As, Cd, Cu, Fe, Pb, Mn, Ni, pH, SO_4, Tl, Zn	Al, As, Sb, Cd, Cu, Fe, Mn, Ni, pH, SO_4, Tl, Zn
7	Tqp - Pot	PAG	PAG	PAG	Mn	Al. As, Cd, Cu, Fe, pH
8	Tfr - Ar	Non-PAG	Non-PAG	Non-PAG	None	pH
9	Ov - Ar	PAG	Non-PAG	Non-PAG	Al, Cd, Cu, Fe, Pb, Mn, Ni, pH, SO_4, Tl, Zn	Al, As, Cd, F, Mn, Ni, pH, SO_4, Zn
12	Ov - Si	Non-PAG	uncertain	Non-PAG	None	As
13	Tqpa - Si	PAG	PAG	PAG	Al, Cd, fluoride, Mn	Al, Cd, fluoride, Mn, pH
14	Tqp - Ph	PAG	PAG	PAG	Al, Cd, Cu, Fe, Pb, Mn, Ni, Tl, Zn	Al, Cd, Cu, fluoride, Fe, Pb, Mn, Ni, pH, SO_4, Tl, TDS, Zn
15	Tqp - Si	PAG	PAG	PAG	None	Al, As, Cd, Cu, fluoride, Fe, Pb, Mn, pH, Zn
16	Tqp - Ph	Non-PAG	Non-PAG	Non-PAG	None	Cd, fluoride, Mn
17	Tqp - Ar	Non-PAG	Non-PAG	Non-PAG	fluoride, Mn	fluoride, Mn
18	Ov - Ar	Uncertain	Non-PAG	Non-PAG	Mn	Mn
19	Ov - Ph	PAG	PAG	Non-PAG	None	Mn
20	Ov - Pr	Non-PAG	Non-PAG	Non-PAG	None	As, Mn
21	Ov - Pr	Non-PAG	Non-PAG	Non-PAG	Mn	As, Mn
22	Tqpa - Si	uncertain	Non-PAG	Non-PAG	None	Al, Cd, fluoride, Mn, Zn
23	Tqpa - Pot	uncertain	Non-PAG	Non-PAG	None	Al, F, Fe, Mn, pH

Cell #	Material Type[2]	Acid Generation Prediction From ABA[1]	NAG Test Prediction[1]	Acid Generation Prediction From HCT	MWMP Constituents Above NDEP Values	HCT Constituents Above NDEP Values
24	Ov - Ph	PAG	PAG	PAG	Al, Be, Cd, Fe, Pb, Mn, Ni, SO_4	Al, Be, Cd, Cu, Fe, Pb, Mn, Ni, pH, SO_4, TDS, Zn
25	Tmr - Ph	uncertain	Non-PAG	Non-PAG	Al, fluoride, Mn	Al, fluoride, Mn, pH, Tl, Zn
26	Tqp - Si	PAG	uncertain	Non-PAG	None	Mn
27	Tmr - Ar	PAG	PAG	PAG	Al, Sb, Be, Cd, Cu, fluoride, Pb, Mn, Ni, Se, SO_4, Tl TDS, Zn	Al, As, Be, Cd, Cu, fluoride, Fe, Pb, Mn, Ni, pH, Se, SO_4, Tl TDS, Zn
28	Tmr - Ph	PAG	PAG	PAG	Cd, Mn, Ni, Th, Zn	Al, Cd, Pb, Mn, Ni, pH SO_4, Tl TDS, Zn
29	Tqp - Pot	PAG	PAG	PAG	fluoride, Mn	Al, Cd, fluoride, Pb, Mn, pH
30	Tqp - Pot	PAG	Non-PAG	Non-PAG	Al, fluoride, Mn	Al, fluoride, Mn, pH
31	Ov - Ar	PAG	PAG	PAG	Cd	Al, Be, Cd, Cu, fluoride, Fe, Pb, Mn, Ni, pH, Th

[1] Criteria used for this assessment are based on the discussion above.

[2] Tmr - Rhyolite Flow/Tuff; Ar - Argillic; Tqp - Early Phase Quartz Porphyry; Ov - Vinini Sediments; Pot - Potassic; Tqpa - Intermediate Phase Quartz Porphyry; Si - Silicic; Ph - Phyllic

3.3.2.2.4 Geochemical Characterization of Waste Rock

The prediction of waste rock geochemical behavior for the Project as described in SRK (2007a) is based on commonly applied criteria for static test results. For the MWMP tests, leachate chemistry data were compared to the comparative standards provided in NDEP WPCP Form 0090 for Profile II constituents to determine those that could exceed the comparative standards, and to what degree, when meteoric water contacted these rocks under certain conditions.

The waste rock characterization program was initially used to identify the potential of Project waste rock material to generate acid or to leach deleterious metals (Table 3.3-3). The results of this program were then applied to define a set of criteria for waste rock classification that can be used during implementation of the WRMP that routes waste rock materials to the different WRDFs.

3.3.3 Environmental Consequences and Mitigation Measures

3.3.3.1 Significance Criteria

Criteria for assessing the significance of potential impacts to the quality of water resources in the Project Area are described below. Impacts to water quality resources are considered to be significant if these criteria are predicted to occur as a result of the Proposed Action or the alternatives.

Table 3.3-3: Waste Characterization Summary

Rock Type	Primary Alteration	Percentage of Total Waste Based on Mine Model	Percentage of Waste Based on Mine Model		Percentage of Waste Based on the 1,546 Pulp Samples			MWMP Constituents Above NDEP Comparative Standards[c]
			Percent LPAG[1]/ Non-PAG	Percent PAG	Percent Non-PAG	Percent LPAG	Percent PAG	
Undefined	Undefined	0.6	73	27	NA	NA	NA	NA
Alluvium	NA	–[a]	–[a]	–[a]	100	0	0	--
Intermediate Phase Quartz Porphyry	Undefined	0.6	98	2	NA	NA	NA	NA
	Potassic	1.1	84	16	71	0	29	None
	Biotite	0.1	100	0	29	29	43	--
	Silicic	1.1	75	25	17	4	78	Cd, Mn
Early Phase Quartz Porphyry	Undefined	6.0	94	6	NA	NA	NA	NA
	Argillic	2.3	82	18	43	0	57	F, Mn
	Phyllic	0.1	10	90	74	1	25	Al, Cd, Cu, Fe, Mn, Pb, Th, pH (<6.5)
	Potassic	12.7	91	9	81	1	18	F, Mn
	Silicic	1.2	98	2	54	0	46	Mn
Rhyolite	Undefined	10.0	60	40	NA	NA	NA	NA
	Argillic	22.9	53	47	68	1	31	Al, Cd, Fe, Mn, Zn, pH (<6.5)
	Phyllic	0.6	30	70	51	2	47	Al, Cd, Mn, Zn
	Potassic	3.5	79	21	79	0	21	--
Vinini Formation Sediments	Undefined	20.5	80	20	NA	NA	NA	NA
	Propylitic	–[b]	–[b]	–[b]	–[b]	–[b]	–[b]	pH (<8.5)
	Argillic	2.9	56	44	70	0	30	Al, As, Cd, Cu, F, Fe, Mn, Ni, Pb, pH (<6.5)
	Phyllic	1.6	66	34	61	8	32	Al, F, Mn
	Potassic/Hornfels	12.1	89	11	71	7	22	Al, F, Mn
	Silicic[5]	0.1	100	0	60	0	40	Al, Cd, Cu, Fe, Mn, Nickel (Ni), Pb, Th, Zn, SO_4, TDS, pH (<6.5)
Totals		**100**	**74**	**26**	**67**	**3**	**30**	
			100		**100**			

NA = Not Applicable

– Indicates no data are available

[1] Limited Potentially Acid Generating (LPAG)

[a] Alluvium comprises an insignificant amount of the total waste rock and was not included in the calculation of waste rock volumes.

[b] Even though waste rock with propylitic alteration would be extracted from the open pit, the volume of this material type cannot be estimated because propylitic alteration was not recognized and documented in past exploration drill logs and as a result cannot be defined as a distinct alteration type in the current mine model.

[c] Determined from a statistical analysis of the data as described in SRK (2007a)

3.3.3.1.1 Surface Water Quality

- Release of mining-related contaminants such as cyanide, or metals such as As and Pb, into drainages by spills or flooding that results in soil or sediment contamination in excess of the NDEP standards specified at NAC 445A.2272.1.(c) or release of fuels and lubricants into drainages resulting in soil contamination exceeding the NDEP guidance level (100 milligrams [mg] per kg [mg/kg] of total petroleum hydrocarbons [TPH]).

- A discharge or change in water quality that results in an exceedance of the applicable water quality standards presented in Table 3.3-1 or specified in NAC 445A.453, or NDEP standards for aquatic life, irrigation, or livestock or potential beneficial uses in perennial streams, springs, seeps, and the post-mining pit lake.

3.3.3.1.2 Ground Water Quality

- Degradation of natural ground water quality by chemicals such that concentrations exceed applicable water quality standards, or render water unsuitable for other existing or potential beneficial uses. For ground water that does not meet applicable water quality standards for baseline conditions, degradation would be considered significant where a change in water quality would render the water unsuitable for an existing or potential beneficial use. This criterion is based on NAC 445A.424.

- Degradation of natural soil chemistry by cyanide, trace metals, or other compounds such that concentrations exceed NDEP guidance levels. NDEP guidance levels for soils are based on results of MWMP testing that are ten times the DWS for each compound. This guidance is designed to protect ground water from contamination by leachate from overlying soils.

3.3.3.2 Assessment Methodology

3.3.3.2.1 Pit Lake Water Quality

Pit lake water quality was assessed in a study by SWS (2010). The model is based on pit infilling data, the ABA and HC data, the chemistry of the local and regional ground water, and the characteristics of the final open pit shell.

The pit lake water quality assessment (SWS 2010) used as its base the distribution of lithologic units, alteration types, and ABA characteristics in the open pit shell developed by SRK (2008d) (Figures 3.3.9 and 3.3.10). This model was developed using Mintec's Mine Site software, based on the data set of over 1,500 pulp samples with ABA results. There were little sampling data from some of the pit wall areas because of the relatively cylindrical nature of the orebody. Where there was a lack of data, a nearest neighbor approach was used to conservatively assign the ABA characteristics of the pit wall. The choice of extrapolating to the pit wall from the core of the ore deposit is believed to be conservative, as the geologic work on the orebody indicates that mineralization becomes more diffuse at the fringes of the deposit, making a lower potential for acid generating material in these areas.

The HCT data, ground water quality data, and ground water inflow data have been discussed in depth in other sections of this document. The data flow of the pit lake study is represented in Figure 3.3.11. The base model uses average humidity cell effluent concentrations to calculate the release of materials from the pit wall due to surface runoff and ground water infilling to the open pit. Assumptions underlying this loading include consideration of the damage to the wall rock due to mining, blasting and surface sloughing of materials. For the base case pit lake model, a scaling factor to account for differences in laboratory and field reaction rates was not incorporated into the model (although it was incorporated into sensitivity analyses). Typically, laboratory reaction rates occur one to three orders of magnitude faster than field reaction rates

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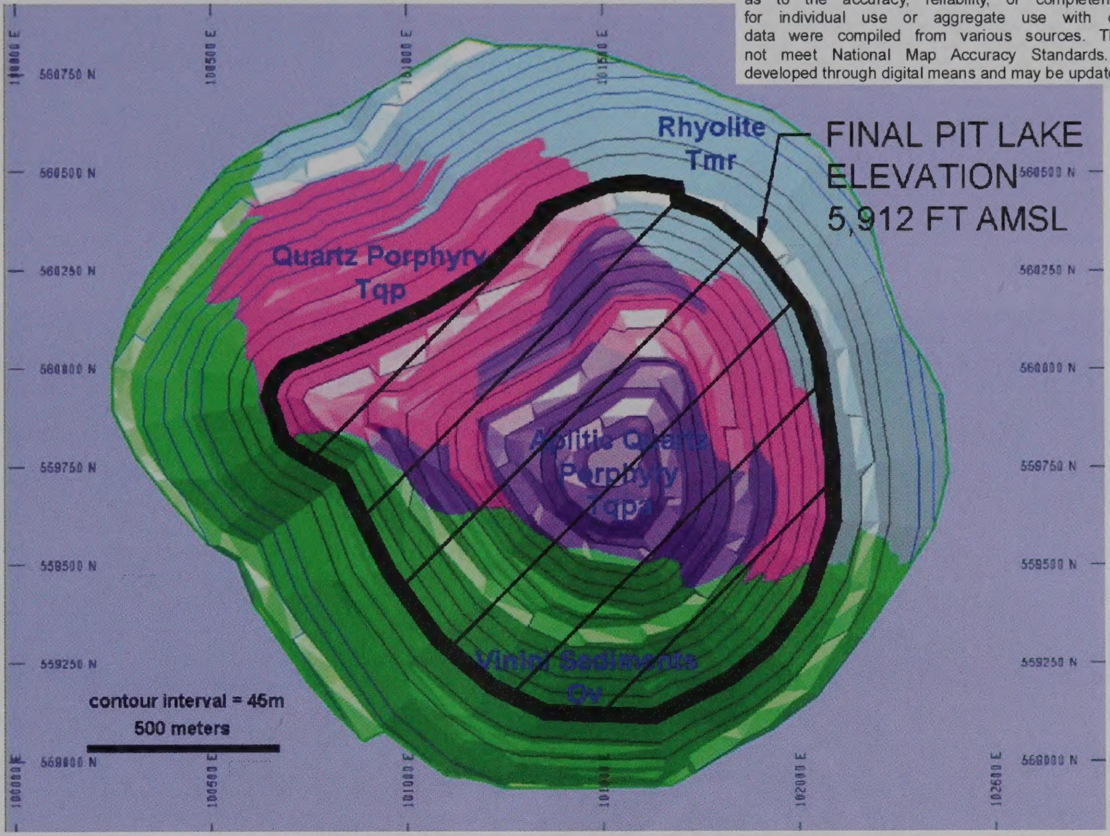
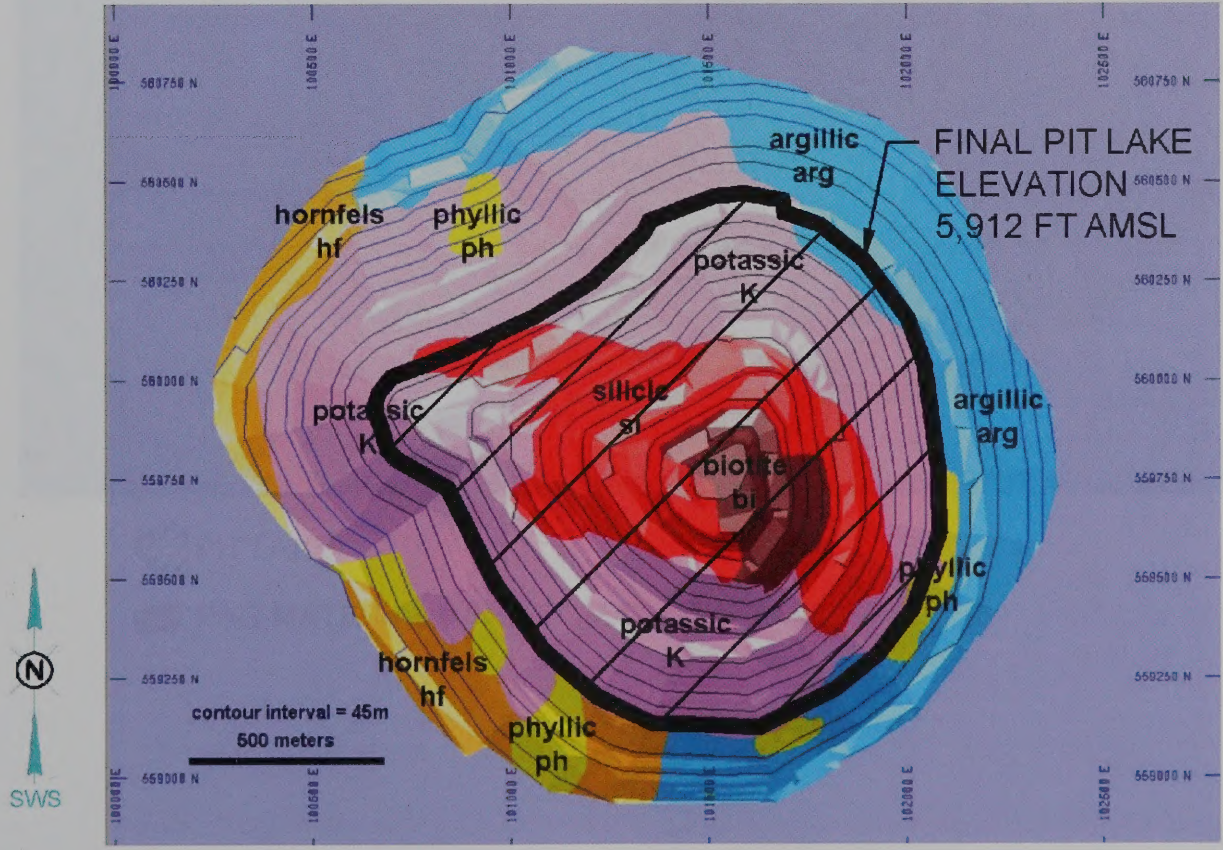

Rhyolite
Tmr
FINAL PIT LAKE ELEVATION 5,912 FT AMSL
Quartz Porphyry
Tqp
Aplitic Quartz Porphyry
Tqpa
Vinini Sediments
Ov
contour interval = 45m
500 meters
100000 E
100500 E
101000 E
101500 E
102000 E
102500 E
560750 N
560500 N
560250 N
560000 N
559750 N
559500 N
559250 N
559000 N

Final Pit Alteration Assemblages


argillic
arg
FINAL PIT LAKE ELEVATION 5,912 FT AMSL
hornfels
hf
phyllic
ph
potassic
K
silicic
si
biotite
bi
argillic
arg
potassic
K
phyllic
ph
potassic
K
hornfels
hf
phyllic
ph
contour interval = 45m
500 meters
N
SWS
100000 E
100500 E
101000 E
101500 E
102000 E
102500 E
560750 N
560500 N
560250 N
560000 N
559750 N
559500 N
559250 N
559000 N

▨ PIT LAKE

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Final Pit Wall Lithologies and Alteration Assemblages in the Mount Hope Pit

Figure 3.3.9

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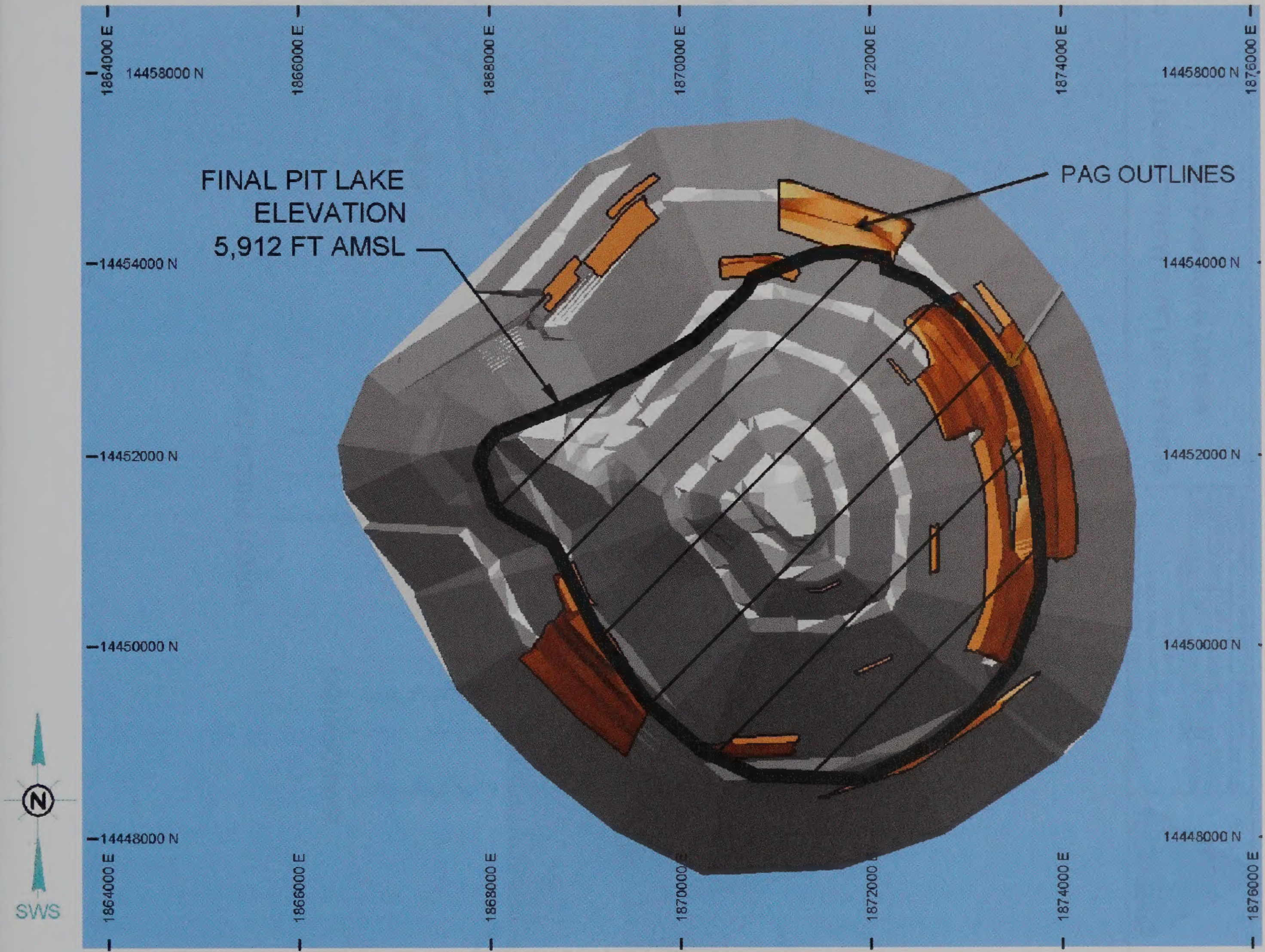
1864000 E
1866000 E
1868000 E
1870000 E
1872000 E
1874000 E
1876000 E
14458000 N
14454000 N
14452000 N
14450000 N
14448000 N
FINAL PIT LAKE ELEVATION 5,912 FT AMSL
PAG OUTLINES
N
SWS

▨ PIT LAKE

🟧 PAG MATERIAL (PROJECTED) ON PIT WALLS

PAG: POTENTIALLY-ACID GENERATING (SRK, 2009a)

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MOUNT HOPE PROJECT

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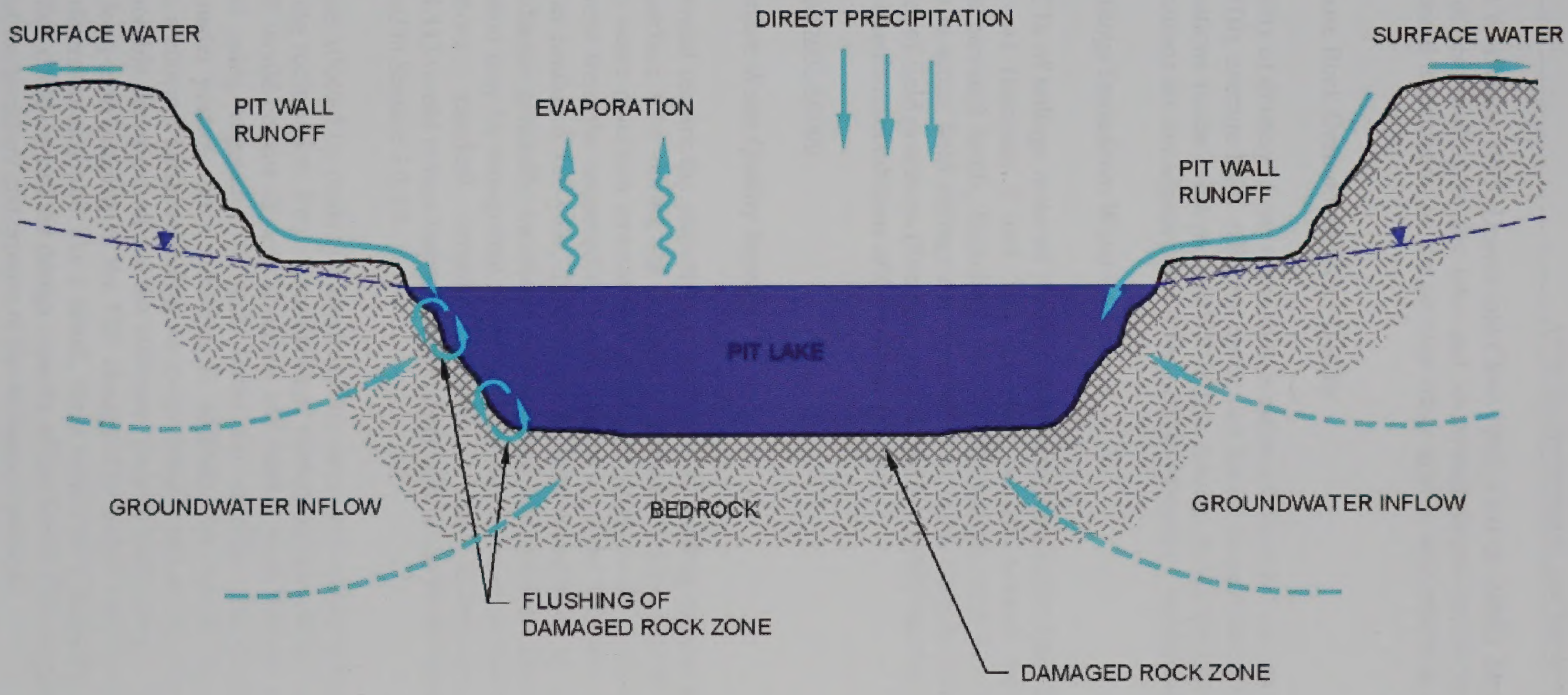
PAG Material (Projected) in the Final Open Pit Shell

Figure 3.3.10



SURFACE WATER
DIRECT PRECIPITATION
SURFACE WATER
PIT WALL RUNOFF
EVAPORATION
PIT WALL RUNOFF
PIT LAKE
GROUNDWATER INFLOW
BEDROCK
GROUNDWATER INFLOW
FLUSHING OF DAMAGED ROCK ZONE
DAMAGED ROCK ZONE

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MOUNT HOPE PROJECT

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Conceptual Model of the Mount Hope Pit Lake

Figure 3.3.11

(Sverdrup and Warfvinge 1995; Drever and Clow 1995; Li et al. 2008). Incorporating this factor would result in less loading to the lake and an overall improvement in the predicted water quality. Additional information on the pit lake water quality assessment is presented in detail in SWS (2010).

3.3.3.2.2 Waste Rock Draindown Water Quality

The water quality of drainage from waste rock is estimated from the results of HCTs. In the mine plan (SWS 2010), average HCT effluents are scaled based on estimates of waste volumes from different formations in the mine plan (SWS 2010). Similar to the pit lake water quality issue, these concentrations are not adjusted for differences in laboratory and field reaction rates.

3.3.3.2.3 Tailings Draindown Water Quality

Results of HCTs of tailings material indicate that draindown water from tailings would have a circumneutral pH (between 7 and 7.4) and may contain several regulated ground water constituents at elevated levels, including As, Al, Sb, fluoride, and Mo (SRK 2008d). Metals concentrations in actual field settings are expected to be lower than the laboratory values due to the slower rates of field processes (Sverdrup and Warfvinge 1995) and the inhibited oxidation of tailings in the inundated conditions of the tailings ponds.

3.3.3.3 Proposed Action

3.3.3.3.1 Surface Water Quality Impacts

The Project would require the alteration or diversion of existing natural drainages and washes that contain surface flow during the infrequent periods of high rainfall and snowmelt. The planned storm water diversion structures would be designed to divert flows of a 100-year, 24-hour storm event from the unnamed drainages upstream of the facilities. The tailings facilities are designed to contain a 100-year, 24-hour storm event in addition to normal process fluids. Surface disturbance generally increases the potential for erosion; therefore, sediment from increased erosion may be transported to and accumulate in the local surface drainages. During mine operations, standard erosion prevention and maintenance procedures (see Section 2.1.1**4.11**) would reduce impacts to less than significant levels based on the significance criteria outlined in Section 3.3.3.1.

Small drainages affected by roads and small facility structures would be returned to their natural condition during reclamation. Permanent drainage alterations around the open pit, WRDFs, and the South TSF would consist of open channels and berms. Such features would be left in place and reclaimed using vegetation or rock lining for stability and elimination of long-term maintenance under post-closure conditions. In addition, the tops of the two TSFs would be designed with a concave surface creating an evaporation basin or playa to retain and evaporate the average monthly precipitation and the 100-year, 24-hour storm event. This design is intended to ensure the long-term integrity of the TSF closure. The North TSF has been designed without an upstream diversion structure. As a result, there would be a potential for substantial storm water run-on that could exceed the design capacity of the North TSF evaporation basin and cause over topping of the structure and erosion of the reclaimed surfaces.

- **Impact 3.3.3.3-1:** There would be a moderate to high potential for impacts to surface water quality due to erosion and possible breaching of the North TSF under the Proposed Action.

  Significance of the Impact: The impact is considered potentially significant.

- **Mitigation Measure 3.3.3.3-1:** EML would submit a North TSF upstream diversion structure design. This design would be of sufficient capacity to divert run-on from the North TSF so that the current evaporate pond design would be sufficient to contain the designed storm events. The design would be submitted to the BLM 24 months prior to the anticipated start of construction. The BLM would approve the design prior to the commencement of construction.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.3-1 would be effective at preventing erosion and possible breaching of the North TSF. The design would be based on an engineering evaluation of the topography and design precipitation event (24 hour-100 year event) as required by the NDEP so that the design event would effectively be conveyed away from the North TSF.

There is a potential impact to the flow of Roberts Creek resulting from mine-related ground water drawdown under the Proposed Action. A decrease in the flow of Roberts Creek could result in an inability to meet the beneficial uses outlined for a Class A surface water body.

- **Impact 3.3.3.3-2:** The ground water drawdown is predicted to be greater than ten feet for the perennial stream segments of Roberts Creek for varying periods of time up to at least 400 years after the end of mining and milling operations.

  Significance of the Impact: The impact is considered potentially significant.

- **Mitigation Measure 3.3.3.3-2:** The measures outlined under Mitigation Measure 3.2.3.3-2 would address the potential reduced flows outlined in the impact.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.3-2 would be effective at preventing degradation of water quality in Roberts Creek. The mitigation measure would restore flows to the creek, which would remove the underlying cause of this potential impact.

3.3.3.3.2 Ground Water Quality Impacts

The Proposed Action includes the lining of the PAG WRDF (see Section 2.1.3.1) with the following: 1) a 12-inch thick engineered subgrade (1 x 10^{-5} cm/sec saturated hydraulic conductivity) and a five-foot thick **non-PAG** base layer for the foundation of the facility; 2) perforated collecting piping with geomembrane under the pipe to promote drainage from the base of the facility to a collection channel at the toe of the facility; 3) diversion channels to route upgradient surface water runoff away from the facility; 4) geomembrane-lined collection channel to route runoff and infiltration into a PAG/low-grade ore storm water collection ponds (Phase 1 and Phase 2); and 5) geomembrane-lined storm water collection ponds (Phase 1 and Phase 2) to capture surface water runoff and infiltration from the facilities. In general, HCT and MWMP testing of non-acid generating materials has found the effluent from these materials to be generally benign. For non-acid generating materials, elevated pH, Mn, and SO_4 are sometimes observed. However, the average chemistry from the non-acid generating materials only exceeds water quality criteria for Al (0.87 mg/L) and Mn (1.47 mg/L). Under the circumneutral pH conditions of the draindown, Al would be expected to precipitate (Lindsay 1979). Mn **values are** already found at levels **above regulatory standards (0.0076 to 25 mg/L) in ground water beneath the site and the levels in the potential seepage would be similar to the existing water quality values beneath the site**. Therefore, the Mn in the draindown would not degrade ground water beneath the non-acid generating waste rock piles. No ground water impacts are anticipated from the disposal of potentially acid generating material as this material would be underlain by a constructed compacted liner preventing leachate loading to ground water.

Each TSF would consist of the following components: impoundment; tailings conveyance and distribution system; reclaim recovery systems; and tailings draindown recovery systems (Figure 2.1.15). Figure 2.1.5 shows the locations of the North and South TSFs. The tailings production rate would range from approximately 21 to 23 million tpy for the 44 years of operation. The combined storage capacity of the TSFs is approximately 966 million dry tons.

The South TSF would have a capacity of approximately 790 million tons, which would equate to approximately 36 years of production. The South TSF would be constructed once the North TSF facility reaches capacity at Year 36, to contain 176 million tons, which would equate to approximately eight years of production.

The TSF embankment foundation and impoundment basin would be lined using a 60 mil (0.06 inch) LLDPE geomembrane, with a K value of 1×10^{-11}cm/s to provide fluid containment. This level of containment exceeds that required by the State of Nevada under NAC 445A.437 for facilities with ground water in excess of 100 feet.

As previously discussed, the water quality of the tailings and PAG waste rock draindown would exceed water quality standards for many constituents. To address this potential water quality impact, both the tailings facility and the PAG waste rock facility would be underlain by liners, and drainage from these facilities collected and managed. This planned management would prevent these low-quality waters from degrading either surface or ground water quality.

Upon closure, both the tailings and the PAG WRDF would be capped and revegetated to reduce the amount of infiltration to these facilities. Water draining from these facilities would continue to be managed through the use of evaporation cells.

Based on the ore and waste rock characteristics, the arid conditions of the mine site limit the amount of infiltration and using the Proposed Action management of mine wastes, the impacts to water quality from stockpiled ore and waste rock are considered less than significant based on the significance criteria outlined in Section 3.3.3.1.

- **Impact 3.3.3.3-3:** There would be a low potential for impacts to ground water quality due to drainage from tailings impoundments and waste rock piles under the Proposed Action.

  Significance of the Impact: The impact is not considered significant.

No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.3.3.3.3 Pit Lake Water Quality Impacts

The pit lake that is anticipated to form in the open pit is expected to fill slowly (Figure 3.3.12), and would be 900 feet deep at 200 years after the end of mining. Overall, the lake is predicted to have a slightly alkaline pH (approximately 7.7) and a moderate alkalinity (approximately 60 mg/L $CaCO_3$) (Figure 3.3.13). As most metals associated with ARD are less mobile at these pH values, overall the water is predicted to be of good quality (Table 3.3-3). Of constituents that are regulated by the State of Nevada, fluoride, SO_4 (Figure 3.3.14), Cd, Mn (Figure 3.3.15), Sb, and Zn (Figure 3.3.16) are expected to be near or above Nevada reference standards and EPA drinking water MCLs Table 3.3-3 water quality criteria (Table 3.3-1).

Initial pit lake water quality is predicted to be good and would meet Nevada enforceable DWS. As evaporation from the lake surface concentrates the dissolved minerals, some water quality constituent concentrations would be predicted to increase over time relative to baseline concentrations and to exceed the present Nevada water quality standards (see Table 3.3-1). The pit lake would be a water of the State of Nevada, and applicable water quality standards would depend on the present and potential beneficial uses of the lake. Access to the open pit by humans and livestock would be restricted. The lake is not intended to be a drinking water source for humans or livestock or to be used for recreational purposes. Therefore, standards to protect these beneficial uses would not be directly applicable. Aquatic standards would also not be applicable since EML does not plan to have the pit lake stocked with fish. This approach is consistent with NAC 445A.429. Exposure to terrestrial and avian wildlife species is discussed in Section 3.23.3.

- **Impact 3.3.3.3-4:** There would be a low potential for impacts to ground water quality due to the formation of a ground water sink in the open pit under the Proposed Action.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

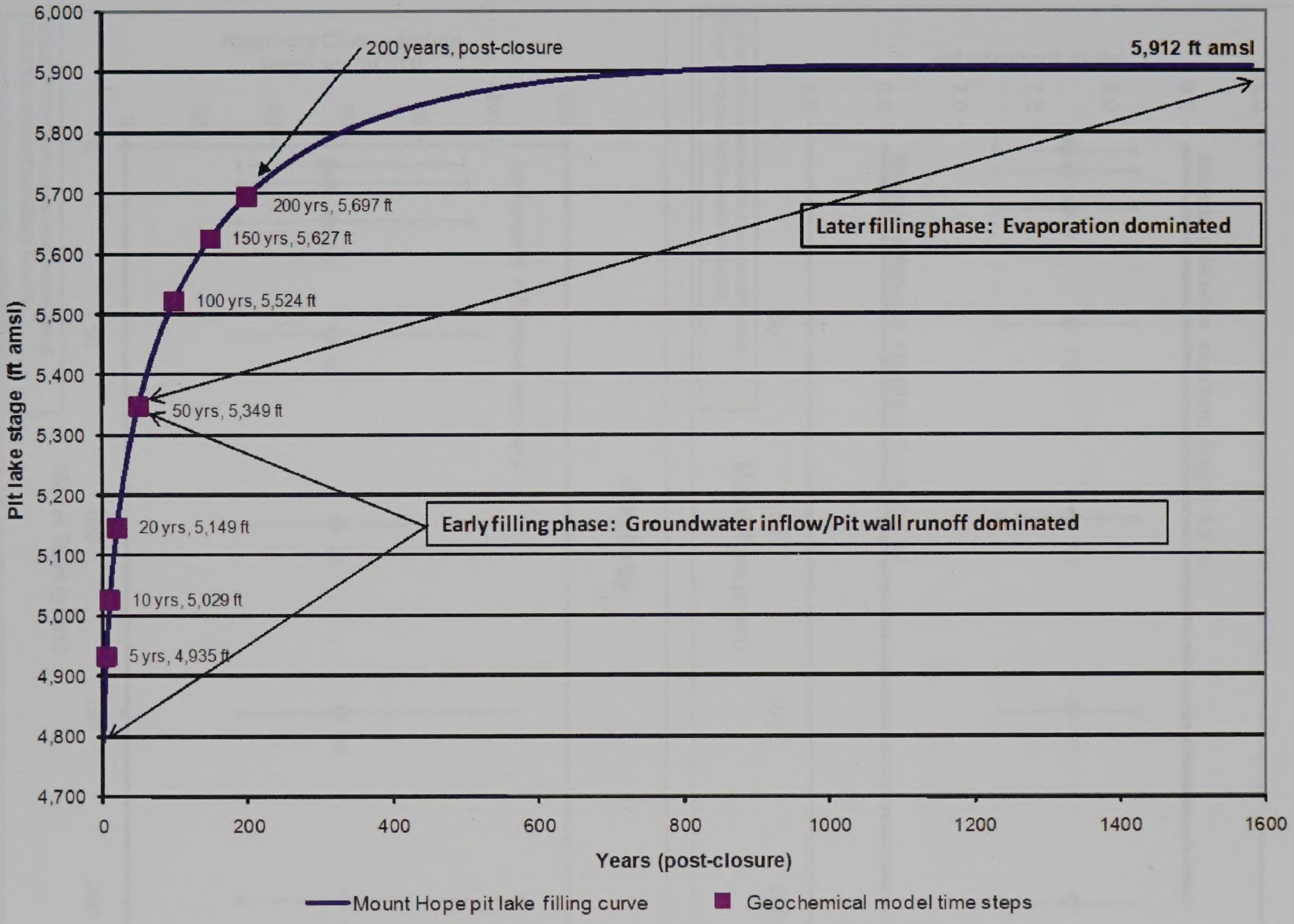
3.3.3.4 No Action Alternative

Implementation of the No Action Alternative is not expected to impact either surface or ground water quality. As there would be no change in the flow regime and no additional pumping, ground water quality is not expected to change. Surface water quality with regard to suspended solids is anticipated to improve as roads and drill sites are reclaimed.

3.3.3.5 Partial Backfill Alternative

3.3.3.5.1 Surface Water Quality Impacts

The Project would require the alteration or diversion of existing natural drainages and washes that contain surface flow during the infrequent periods of high rainfall and snowmelt. The planned storm water diversion structure has been designed to divert flows of a 100-year, 24-hour storm event from the unnamed drainages upstream of the facilities. The tailings facilities would



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BUREAU OF LAND MANAGEMENT

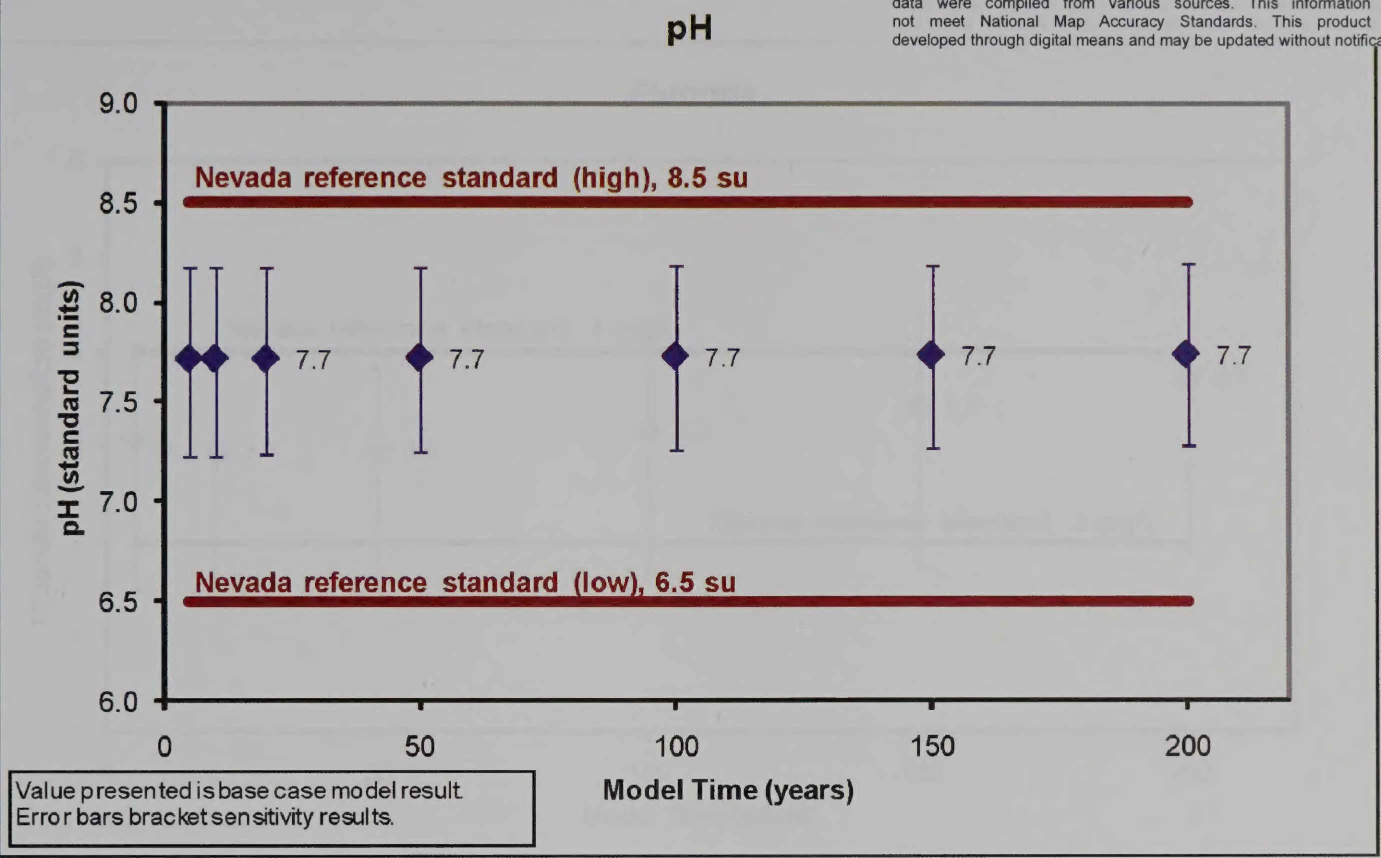
MOUNT HOPE PROJECT

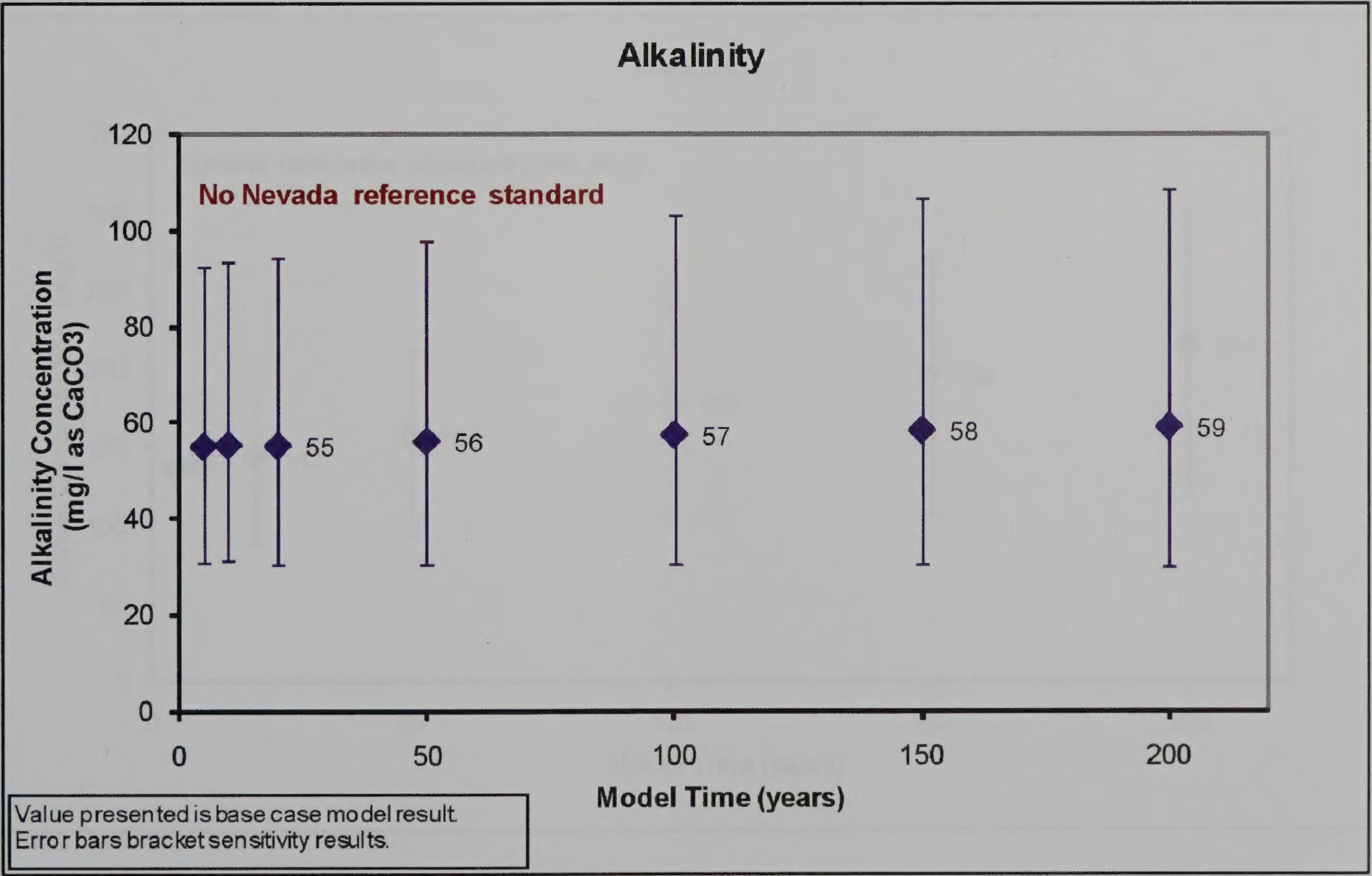
DRAWING TITLE:

Projected Pit Lake Filling Curve of the Mount Hope Pit Lake

Figure 3.3.12

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.





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BUREAU OF LAND MANAGEMENT

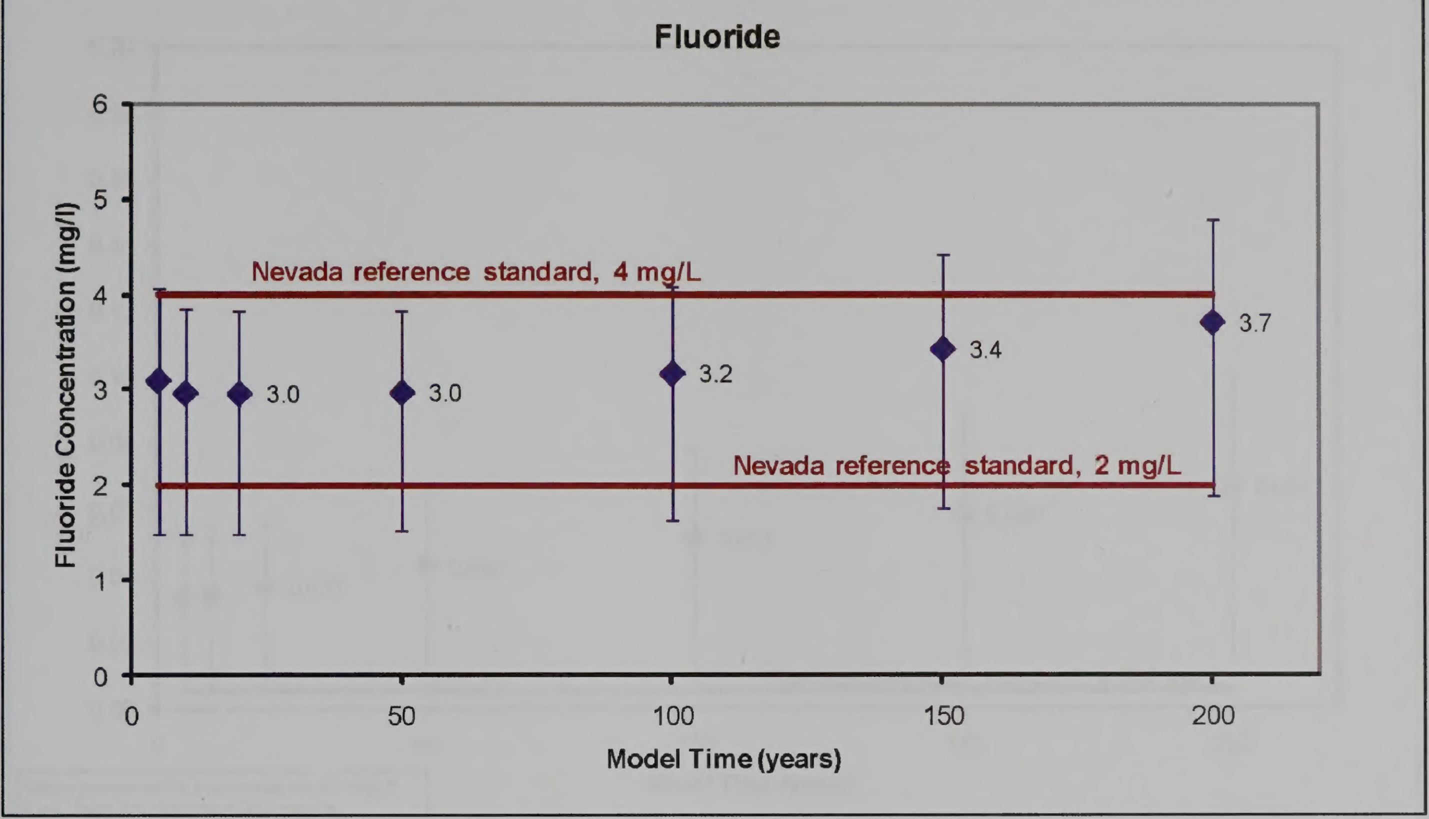
MOUNT HOPE PROJECT

DRAWING TITLE:

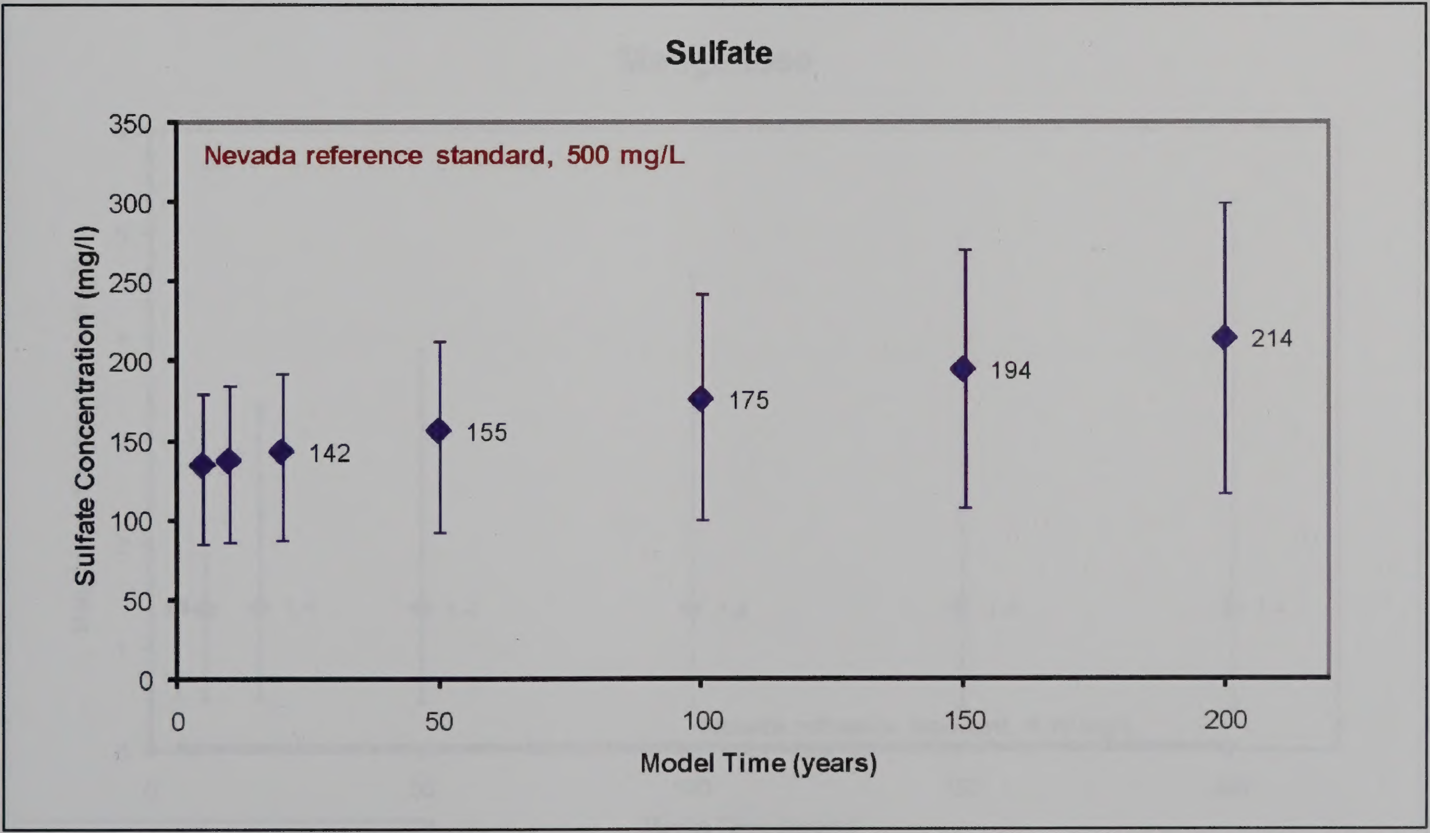
Projected pH and Alkalinity in the Pit Lake (SWS 2010)

Figure 3.3.13

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.



Fluoride



Sulfate

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BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Projected Fluoride and Sulfate in the Mount Hope Pit Lake (SWS 2010)

Figure 3.3.14

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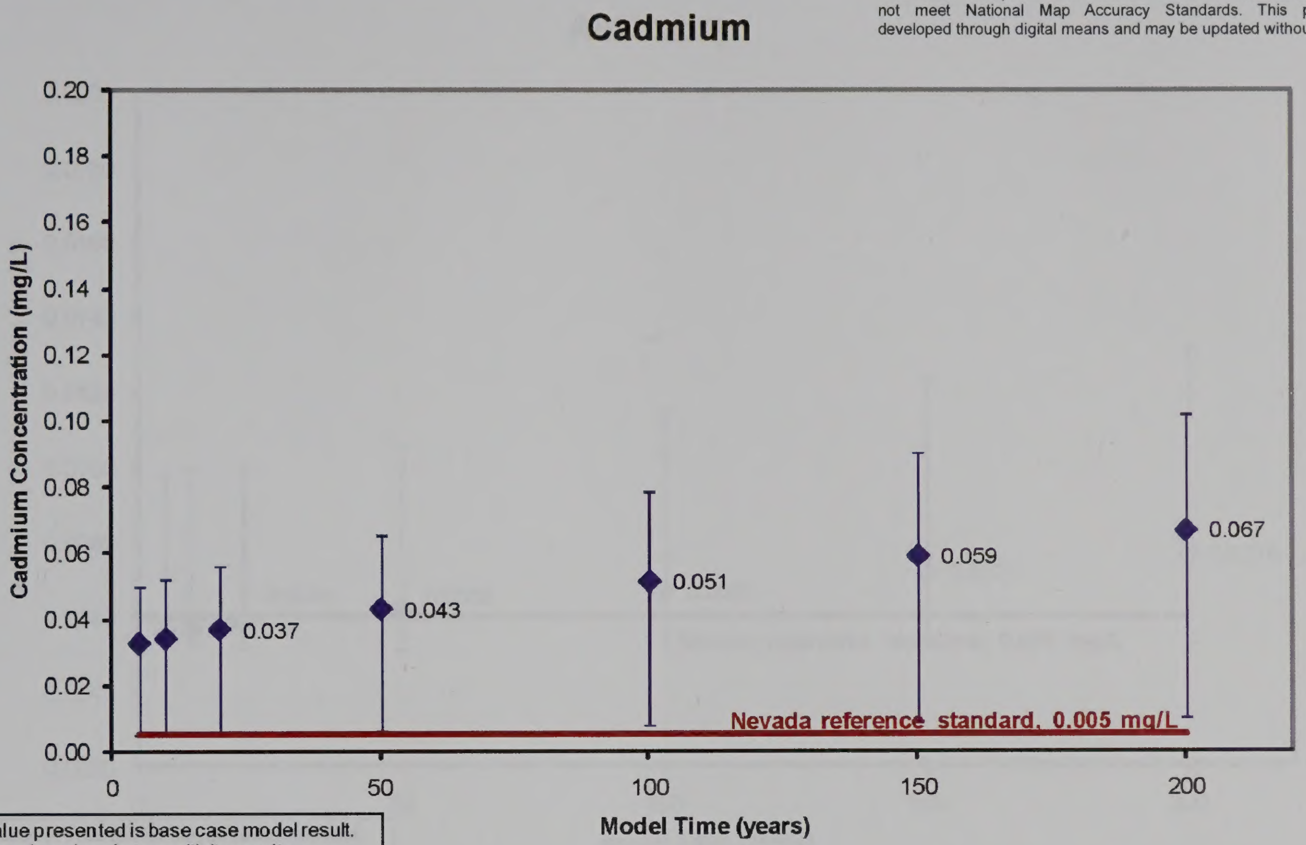

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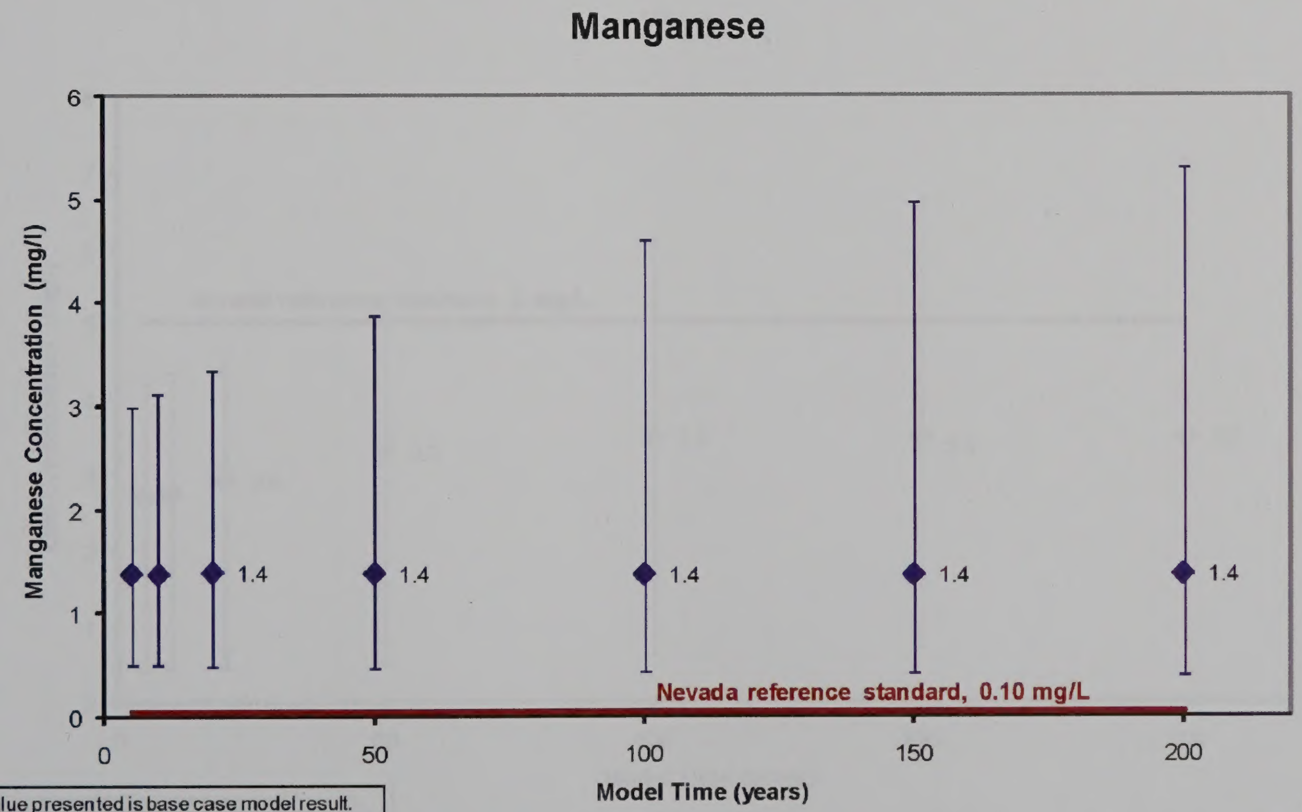
Error bars bracket sensitivity results.



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BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Projected Cadmium and Manganese in the Mount Hope Pit Lake (SWS 2010)

Figure 3.3.15

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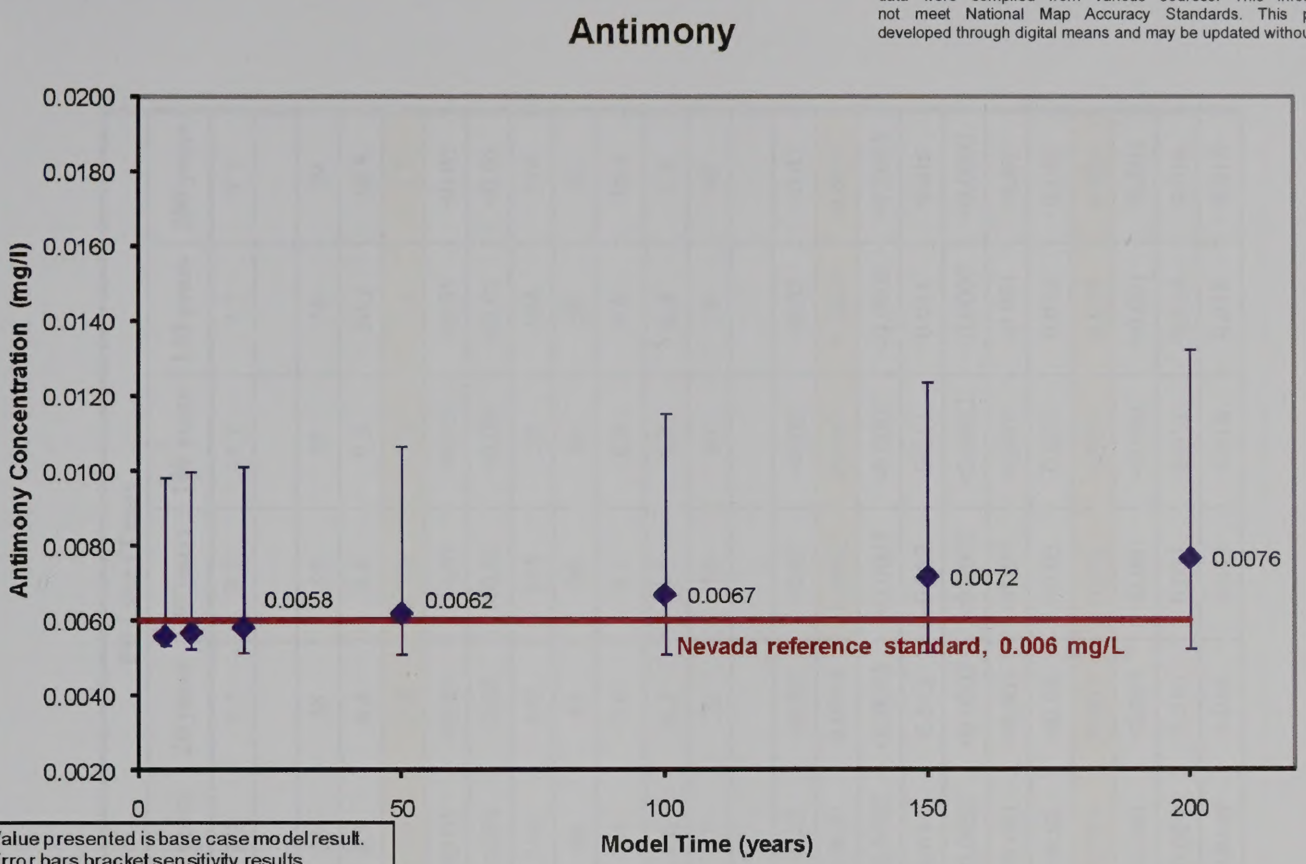

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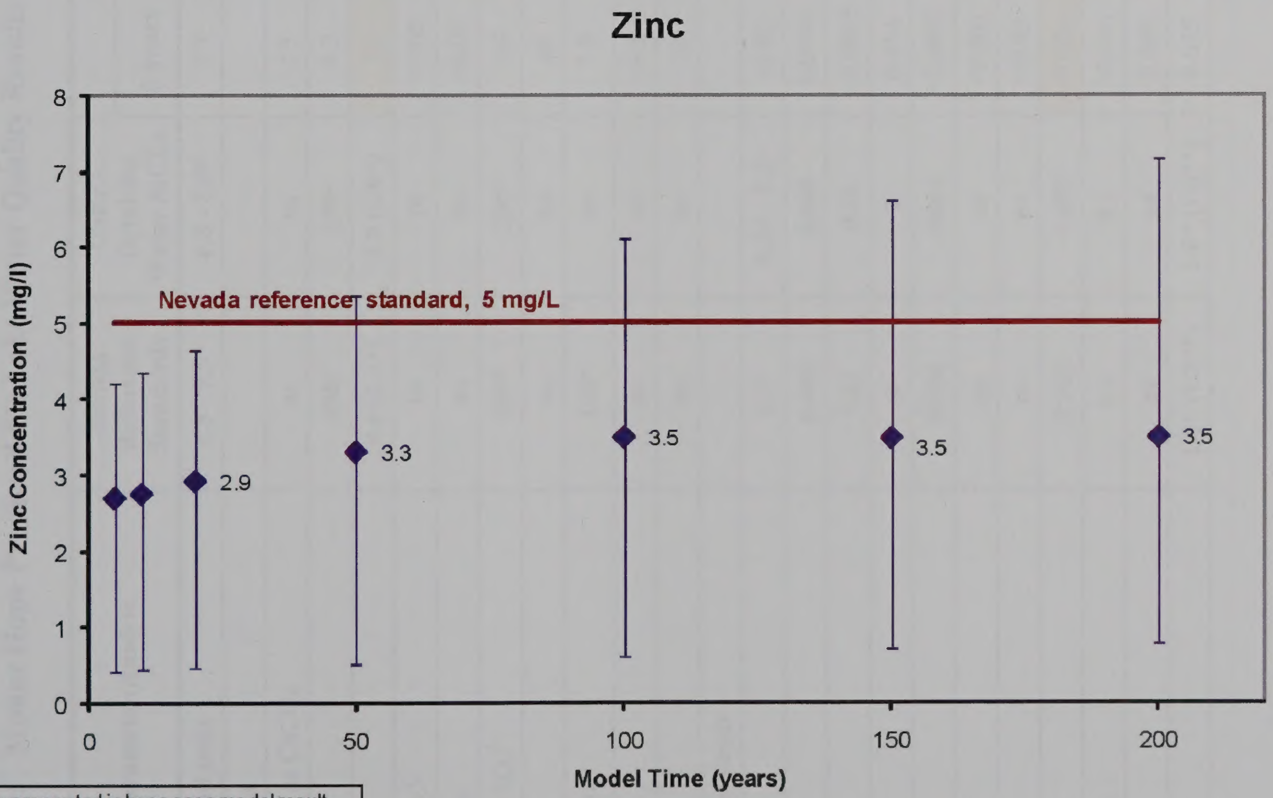

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BUREAU OF LAND MANAGEMENT

MOUNT HOPE PROJECT

DRAWING TITLE:

Projected Antimony and Zinc in the Mount Hope Pit Lake

Figure 3.3.16

Table 3.3-3: Mount Hope Predicted Pit Lake Water Quality Results

Parameter/Analyte	Nevada Reference Standards	USEPA Drinking Water MCLs	Pit Lake (Time)						
			5 years	10 years	20 years	50 years	100 years	150 years	200 years
pH, standard units	**6.5 - 8.5***	**6.5 - 8.5***	7.7	7.7	7.7	7.7	7.7	7.7	7.7
Major Ions									
Alkalinity, as $CaCO_3$	**ns**	**ns**	55	55	55	56	57	58	59
Chloride	**400***	**250***	8.2	8.3	8.4	8.8	9.5	10.1	10.8
Fluoride	**4.0 (2.0*)**	**4.0 (2.0*)**	3.1	3.0	3.0	3.0	3.2	3.4	3.7
Nitrate, As N	**10**	**10**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phosphorus	**ns**	**ns**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulfate, as SO_4^{2-}	**500***	**250***	134	136	142	155	175	194	214
Calcium	**ns**	**ns**	46	46	47	50	54	58	62
Magnesium	**150***	**ns**	7.3	7.4	7.6	8.1	8.9	9.6	10.4
Potassium	**ns**	**ns**	4.5	4.6	4.7	5.1	5.7	6.3	6.8
Sodium	**ns**	**ns**	26	27	28	30	34	38	42
Metals/Metaloids									
Aluminum	**0.2***	**0.05 - 0.2***	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Antimony	**0.006**	**0.006**	0.0056	0.0057	0.0058	0.0062	0.0067	0.0072	0.0076
Arsenic	**0.01**	**0.01**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Barium	**2**	**2**	0.014	0.014	0.013	0.012	0.011	0.011	0.010
Beryllium	**0.004**	**0.004**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Bismuth	**ns**	**ns**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	**ns**	**ns**	<0.05	<0.05	<0.05	<0.05	0.053	0.059	0.065
Cadmium	**0.005**	**0.005**	0.033	0.034	0.037	0.043	0.051	0.059	0.067
Chromium	**0.1**	**0.1**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	**ns**	**ns**	0.009	0.009	0.010	0.011	0.013	0.014	0.016
Copper	**1.0* (1.3**)**	**1.0* (1.3**)**	0.015	0.0149	0.016	0.016	0.018	0.018	0.018

Parameter/Analyte	Nevada Reference Standards	USEPA Drinking Water MCLs	Pit Lake (Time)						
			5 years	10 years	20 years	50 years	100 years	150 years	200 years
Iron	**0.6***	**0.3***	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	**0.015****	**0.015****	0.00045	0.00043	0.00045	0.00048	0.00051	0.00052	0.00053
Lithium	**ns**	**ns**	0.0042	0.0045	0.0048	0.0057	0.0069	0.0079	0.0090
Manganese	**0.10***	**0.05***	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Mercury	**0.002**	**0.002**	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	**ns**	**ns**	0.074	0.078	0.083	0.094	0.11	0.12	0.13
Nickel	**0.1**	**ns**	0.023	0.023	0.025	0.028	0.034	0.038	0.043
Selenium	**0.05**	**0.05**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Silver	**0.1***	**0.1***	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium	**ns**	**ns**	0.22	0.22	0.22	0.23	0.24	0.26	0.28
Thallium	**0.002**	**0.002**	0.00055	0.00056	0.00058	0.00063	0.00069	0.00075	0.00083
Tin	**ns**	**ns**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	**ns**	**ns**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	**5.0***	**5***	2.7	2.7	2.9	3.3	3.5	3.5	3.5

STANDARDS PRESENTED ARE NOT APPLICABLE TO THE PIT LAKE WATER. FOR REFERENCE PURPOSES ONLY.

Nevada Reference Standards are based on Nevada primary and secondary **DWS**, action levels, and beneficial use standards.
* Based on secondary standards. ** Based on Pb and Cu action levels. ns - no standards.
Exceedances of a Nevada Reference Standards are highlighted.
All concentrations are in mg/L, unless otherwise noted.
< Analyte concentration result is below typical analytical detection limits. The value shown is the detection limit.

be designed to contain a 100-year, 24-hour storm event in addition to normal process fluids. Surface disturbance generally causes an increase in erosion, therefore, sediment from increased erosion may be transported to and accumulate in the local surface drainages. During mine operations, standard erosion prevention and maintenance procedures (see Section 2.1.15) would reduce impacts to less than significant levels.

Small drainages affected by roads and small facility structures would be returned to their natural condition during reclamation. Permanent drainage alterations around the open pit, WRDFs, and the South TSF would consist of open channels and berms. Such features would be left in place and reclaimed using revegetation or rock lining for stability and elimination of long-term maintenance under post-closure conditions. In addition, the tops of the two TSFs would be designed with a concave surface creating an evaporation basin or playa to retain and evaporate the average monthly precipitation and the 100-year, 24-hour storm event. This design is intended to ensure the long-term integrity of the TSF closure. The North TSF has been designed without an upstream diversion structure. As a result, there would be a potential for substantial storm water run-on that could exceed the design capacity of the North TSF evaporation basin and cause over topping of the structure and erosion of the reclaimed surfaces.

- **Impact 3.3.3.5-1:** There would be a moderate to high potential for impacts to surface water quality due to erosion and possible breaching of the North TSF under the Partial Backfill Alternative.

  Significance of the Impact: The impact is considered potentially significant.

- **Mitigation Measure 3.3.3.5-1:** EML would submit a North TSF upstream diversion structure design. This design would be of sufficient capacity to divert run-on from the North TSF so that the current evaporate pond design would sufficient to contain the designed storm events. The design would be submitted to the BLM 24 months prior to the anticipated start of construction. The BLM would approve the design prior to the commencement of construction.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.5-1 would be effective preventing erosion and possible breaching of the North TSF. The design would be based on an engineering evaluation of the topography and design precipitation event (24 hour-100 year event) as required by the NDEP so that the design event would effectively be conveyed away from the North TSF.

- **Impact 3.3.3.5-2:** The ground water drawdown is predicted to be more than ten feet for the perennial stream segments of Roberts Creek for varying periods of time up to at least 400 years after the end of mining and milling operations.

  Significance of the Impact: The impact is considered potentially significant.

- **Mitigation Measure 3.3.3.5-2:** The measures outlined under Mitigation Measure 3.2.3.5-2 would address the potential reduced flows outlined in the impact.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.5-2 would be effective at preventing degradation of water quality in

Roberts Creek. The mitigation measure would restore flows to the creek, which would remove the underlying cause of this potential impact.

3.3.3.5.2 Ground Water Quality Impacts

Under the Partial Backfill Alternative, ground water quality impacts from tailings and waste rock draindown would be expected to be similar to those under the pit lake alternative.

- **Impact 3.3.3.5-3:** There would be a low potential for impacts to ground water quality due to drainage from tailings impoundments and waste rock piles under the Partial Backfill Alternative.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.3.3.5.3 Pit Lake Water Quality Impacts

Under the Partial Backfill Alternative, the ground water quality within the pit backfill would be anticipated to be impacted by waste materials (Non-PAG) deposited in the open pit and from infiltrating the runoff from pit walls. This poor-quality water could flow from the confines of the former pit shell into the surrounding ground water, degrading waters of the state. Assuming that non-acid generating materials are placed in the open pit, the ground water entrained within the backfill would contain elevated levels of constituents observed in HCT draindown (Mn, SO_4, pH), as well as constituents found in runoff from the pit walls (including Cd, fluoride, and Mn) (SWS 2010). While a specific water balance has not been developed for the ground water entrained in the backfill, it is expected that this water quality would exceed Nevada **DWS** for the above listed constituents.

Under the Partial Backfill Alternative, the modeling conducted by InTerraLogic (2011) was designed to predict the composition of future pore water quality in the backfilled open pit. The results for the post-closure period, just prior to the point of well-defined ground water throughflow (approximately 210 years) are presented in Table 3.3-4. At the point of throughflow, the pH of the open pit backfill pore water is predicted to be circum-neutral, at a pH of approximately 6.8. Sulfate concentrations are low or below analytical detection; however, concentrations of fluoride, Sb, Cd, and Mn are predicted to be present above the Nevada Reference values (Table 3.3-4).

Table 3.3-4: Partial Backfill Alternative Predicted Pore Water Quality Results

Parameter/Analyte	Nevada Reference Standards (mg/L)	Backfill Pore Water Quality at 210 Years (mg/L)
pH, standard units	6.5 – 8.5*	6.8
Major Ions		
Alkalinity, as CaCO3	ns	64
Chloride	400*	12
Fluoride	4.0 (2.0*)	3.8
Nitrate, as N	10	<0.05

Parameter/Analyte	Nevada Reference Standards (mg/L)	Backfill Pore Water Quality at 210 Years (mg/L)
Phosphorus	ns	<0.05
Sulfate, as SO_4^{2-}	500*	177
Calcium	ns	53
Magnesium	150*	9.3
Potassium	ns	11
Sodium	ns	37
Metals/Metaloids		
Aluminum	0.2*	0.044
Antimony	0.006	0.0061
Arsenic	0.01	<0.0005
Barium	2	0.012
Beryllium	0.004	<0.0002
Bismuth	ns	<0.001
Boron	ns	0.11
Cadmium	0.005	0.037
Chromium	0.1	<0.001
Cobalt	ns	0.0083
Copper	1.0* (1.3**)	0.032
Iron	0.6*	0.57
Lead	0.015**	0.00028
Lithium	ns	0.0082
Manganese	0.10*	2.1
Mercury	0.002	<0.0002
Molybdenum	ns	0.36
Nickel	0.1	0.026
Selenium	0.05	0.0018
Silver	0.1*	<0.005
Strontium	ns	0.22
Thallium	0.002	0.0060
Tin	ns	0.0023
Titanium	ns	<0.001
Vanadium	ns	0.012
Zinc	5.0*	2.8

ns = no standard; * = based on secondary standard; ** = based Pb and Cu action levels.
Exceedances of the Nevada Reference Standards are highlighted.

Over the long term, water would continue to move through the backfill and into the downgradient ground water system (Diamond Valley). The chemistry of this throughflow water would gradually evolve as the readily-soluble chemical mass in the backfill is rinsed out. Eventually the throughflow water would resemble a mixture of the upgradient ground water, percolation of precipitation through the backfill, and open pit wall runoff, **which would exceed Nevada DWS.**

- **Impact 3.3.3.5-4:** It is expected that the ground water flowing from backfill material would exceed Nevada **DWS** under the Partial Backfill Alternative.

  Significance of the Impact: The impacts to ground water quality under the Partial Backfill Alternative would be significant.

- **Mitigation Measure 3.3.3.5-4:** Mitigation for this impact would require the removal of sufficient backfill material for the formation of an evaporative ground water sink.

Implementation of this mitigation would be otherwise inconsistent with the reasoning for selecting this alternative.

Residual Impact: Based on the assumption that the mitigation would not be implemented, the residual impact of the Partial Backfill Alternative on ground water quality would be the long-term degradation of the ground waters of the state.

3.3.3.6 Off-Site Transfer of Ore Concentrate for Processing Alternative

3.3.3.6.1 Surface Water Quality Impacts

Under the Off-Site Transfer of Ore Concentrate for Processing Alternative, surface water quality impacts would be similar to the Proposed Action.

- **Impact 3.3.3.6-1:** There would be a moderate to high potential for impacts to surface water quality due to erosion and possible breaching of the North TSF under the Off-Site Transfer of Ore Concentrate for Processing Alternative.

  Significance of the Impact: The impact is considered potentially significant.

- **Mitigation Measure 3.3.3.6-1:** EML would submit a North TSF upstream diversion structure design. This design would be of sufficient capacity to divert run-on from the North TSF so that the current evaporate pond design would be sufficient to contain the designed storm events. The design would be submitted to the BLM 24 months prior to the anticipated start of construction. The BLM would approve the design prior to the commencement of construction.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.6-1 would be effective at preventing erosion and possible breaching of the North TSF. The design would be based on an engineering evaluation of the topography and design precipitation event (24 hour-100 year event) as required by the NDEP so that the design event would effectively be conveyed away from the North TSF. With the implementation of the mitigation measure, the residual impact of the Off-Site Transfer of Ore Concentrate for Processing Alternative would be limited to natural erosion processes.

- **Impact 3.3.3.6-2:** The ground water drawdown is predicted to be more than ten feet for the perennial stream segments of Roberts Creek for varying periods of time up to at least 400 years after the end of mining and milling operations.

  Significance of the Impact: The impact is considered potentially significant.

- **Mitigation Measure 3.3.3.6-2:** The measures outlined under Mitigation Measure 3.2.3.3-2 would address the potential reduced flows outlined in the impact.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.6-2 would be effective at preventing degradation of water quality in Roberts Creek. The mitigation measure would restore flows to the creek, which would remove the underlying cause of this potential impact.

3.3.3.6.2 Ground Water Quality Impacts

Under the Off-Site Transfer of Ore Concentrate for Processing Alternative ground water quality impacts would be indistinguishable from the Proposed Action.

- **Impact 3.3.3.6-3:** There would be a low potential for impacts to ground water quality due to drainage from tailings impoundments and waste rock piles under the Off-Site Transfer of Ore Concentrate for Processing Alternative.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.3.3.6.3 Pit Lake Water Quality Impacts

Under the Off-Site Transfer of Ore Concentrate for Processing Alternative pit lake water quality impacts would be indistinguishable from the Proposed Action.

- **Impact 3.3.3.6-4:** There would be a low potential for impacts to ground water quality due to the formation of a ground water sink in the open pit under the Off-Site Transfer of Ore Concentrate for Processing Alternative.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.3.3.7 Slower, Longer Project Alternative

3.3.3.7.1 Surface Water Quality Impacts

Under the Slower, Longer Project Alternative, surface water quality impacts would be similar to the Proposed Action; however, the timing of those potential impacts could differ due to the extended operating time frames for this alternative.

- **Impact 3.3.3.7-1:** There would be a moderate to high potential for impacts to surface water quality due to erosion and possible breaching of the North TSF under the Slower, Longer Project Alternative.

  Significance of the Impact: The impact is considered potentially significant.

- **Mitigation Measure 3.3.3.7-1:** EML would submit a North TSF upstream diversion structure design. This design would be of sufficient capacity to divert run-on from the North TSF so that the current evaporate pond design would be sufficient to contain the designed storm events. The design would be submitted to the BLM 24 months prior to the anticipated start of construction. The BLM would approve the design prior to the commencement of construction.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.7-1 would be effective at preventing erosion and possible breaching of the North TSF. The design would be based on an engineering evaluation of the topography and design precipitation event (24 hour-100 year event) as required by the NDEP so that the design event would effectively be conveyed away from the North TSF.
  With the implementation of the mitigation measure, the residual impact of the Slower, Longer Project Alternative would be limited to natural erosion processes.

- **Impact 3.3.3.7-2:** The ground water drawdown is predicted to be more than ten feet for the perennial stream segments of Roberts Creek for varying periods of time up to at least 400 years after the end of mining and milling operations.

  Significance of the Impact: The impact is considered potentially significant.

- **Mitigation Measure 3.3.3.7-2:** The measures outlined under Mitigation Measure 3.2.3.7-2 would address the potential reduced flows outlined in the impact.

- **Effectiveness of Mitigation and Residual Effects:** Implementation of the Mitigation Measure 3.3.3.7-2 would be effective at preventing degradation of water quality in Roberts Creek. The mitigation measure would restore flows to the creek, which would remove the underlying cause of this potential impact.

3.3.3.7.2 Ground Water Quality Impacts

Under the Slower, Longer Project Alternative ground water quality impacts would be indistinguishable from the Proposed Action; however, the timing of those potential impacts could differ due to the extended operating time frames for this alternative.

- **Impact 3.3.3.7-3:**There would be a low potential for impacts to ground water quality due to drainage from tailings impoundments and WRDFs under the Slower, Longer Project Alternative.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

3.3.3.7.3 Pit Lake Water Quality Impacts

Under the Slower, Longer Project Alternative pit lake water quality impacts would be indistinguishable from the Proposed Action.

- **Impact 3.3.3.7-4:** There would be a low potential for impacts to ground water quality due to the formation of a ground water sink in the open pit under the Slower, Longer Project Alternative.

  Significance of the Impact: The impact is not considered significant.

  No mitigation is proposed for this impact; see Section 3.1.1 for a general discussion of significance and the development of mitigation measures.

The Mount Hope **Final** EIS **is** continued in Volume II.

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